

SEARCH REQUEST FORM

Scientific and Technical Information Center

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Requester's Full Name: Carmie Thompson Examiner #: 79244 Date: 6/12/03
 Art Unit: 1774 Phone Number 30 54488 Serial Number: 10/068353
 Mail Box and Bldg/Room Location: CP3 11B/28 Results Format Preferred (circle): PAPER DISK E-MAIL

If more than one search is submitted, please prioritize searches in order of need.

Please provide a detailed statement of the search topic, and describe as specifically as possible the subject matter to be searched. Include the elected species or structures, keywords, synonyms, acronyms, and registry numbers, and combine with the concept or utility of the invention. Define any terms that may have a special meaning. Give examples or relevant citations, authors, etc, if known. Please attach a copy of the cover sheet, pertinent claims, and abstract.

Title of Invention: Organic Electroluminescent Device + display unit
 Inventors (please provide full names): Nanyuki Ueda; Ichiro Takada; Tetsuo Shibamura; Mari Ichimura; Shinichiro Tamura
 Earliest Priority Filing Date: Feb. 6, 2001

For Sequence Searches Only Please include all pertinent information (parent, child, divisional, or issued patent numbers) along with the appropriate serial number.

Please do a CAS search on formulas I-VI

and do a search on claims 1-17.

Thanks! Please see attached.

talk to
Nari
about
drug
selection of
species.

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 Searcher Phone #: _____
 Searcher Location: _____
 Date Searcher Picked Up: _____
 Date Completed: 6-13-03
 Searcher Prep & Review Time: 10
 Clerical Prep Time: _____
 Online Time: 80

Type of Search

NA Sequence (#) _____ STN _____
 AA Sequence (#) _____
 Structure (#) _____
 Bibliographic _____
 Litigation _____
 Fulltext _____
 Patent Family _____
 Other _____

Vendors and cost where applicable

\$ 204.18

Dialog

(4) Subjects
Pubset/Orbit

and Link

Lexis/Nexis

Sequence Systems

WWW/Internet

Other (specify)

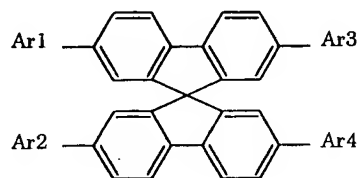
WHAT IS CLAIMED IS:

1. An organic electroluminescent device comprising at least a hole transportation layer and a luminescent layer held between an anode and a cathode in a state of lamination in that order from the anode side, wherein:

the luminescent layer comprises a spiro compound represented by the following Structural formula (1) or a derivative thereof; and

the hole transportation layer comprises triphenylamine tetramer represented by the following Structural formula (2) or the following Structural formula (3), or a derivative thereof:

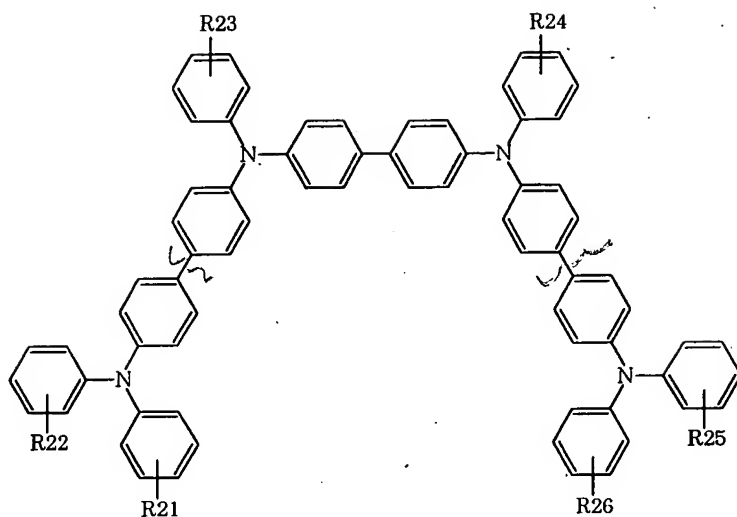
Structural formula (1)



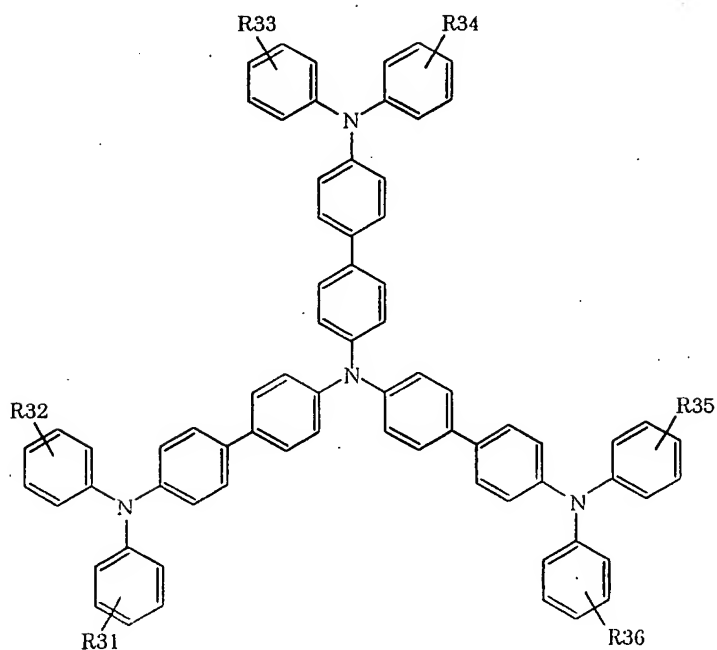
or derivative of

10059353-020602

Structural formula (2)



Structural formula (3)

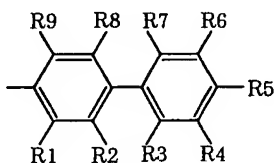


where Ar1 to Ar4 in the Structural formula (1)
independently represent a biphenyl group, substituted

biphenyl group, naphthyl group, substituted naphthyl group, anthryl group, or substituted anthryl group, and R21 to R26 in the Structural formula (2) and R31 to R36 in the Structural formula (3) independently represent hydrogen, alkyl group having the number of carbon atoms of 1 to 12, cycloalkyl group, aryl group having the number of carbon atoms of 5 to 28, or substituted aryl group.

2. The organic electroluminescent device according to Claim 1, wherein at least one of Ar1 to Ar4 in the Structural formula (1) is a biphenyl group or substituted biphenyl group represented by the following Structural formula (4):

Structural formula (4)

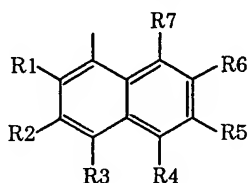


where R1 to R9 in the Structural formula (4) independently represent hydrogen, alkyl group having the number of carbon atoms of 1 to 12, cycloalkyl group, aryl group having the number of carbon atoms of 5 to 28, or substituted aryl group.

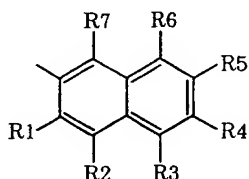
3. The organic electroluminescent device according to

Claim 1, wherein at least one of Ar1 to Ar4 in the Structural formula (1) is a naphthyl group or substituted naphthyl group represented by the following Structural formula (5) or Structural formula (6):

Structural formula (5)



Structural formula (6)

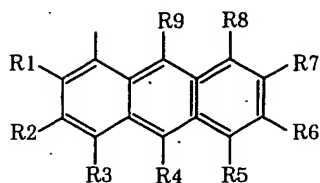


where R1 to R7 in the Structural formula (5) and Structural formula (6) independently represent hydrogen, alkyl group having the number of carbon atoms of 1 to 12, cycloalkyl group, aryl group having the number of carbon atoms of 5 to 28, or substituted aryl group.

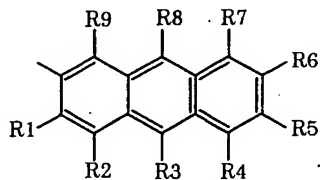
4. The organic electroluminescent device according to Claim 1, wherein at least one of Ar1 to Ar4 in the Structural formula (1) is an anthryl group or substituted anthryl group represented by the following Structural formula (7), Structural formula (8), or Structural formula

(9):

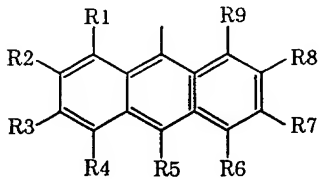
Structural formula (7)



Structural formula (8)



Structural formula (9)



where R1 to R9 in the Structural formula (7),
Structural formula (8), and Structural formula (9)
independently represent hydrogen, alkyl group having the
number of carbon atoms of 1 to 12, cycloalkyl group, aryl
group having the number of carbon atoms of 5 to 28, or
substituted aryl group.

5. The organic electroluminescent device according to
Claim 1, wherein an electron transportation layer is

provided between the cathode and the luminescent layer.

6. The organic electroluminescent device according to Claim 1, wherein at least one of the anode and cathode comprises a transmission material.

7. The organic electroluminescent device according to Claim 1, wherein the cathode comprises a transmission material.

8. The organic electroluminescent device according to Claim 7, wherein the cathode comprises an alloy of magnesium and silver.

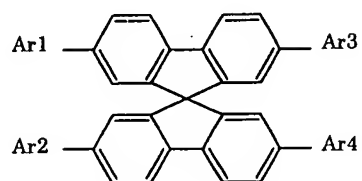
9. A display unit comprising a plurality of pixels formed by arraying organic electroluminescent devices comprising at least a hole transportation layer and a luminescent layer held between an anode and a cathode in a state of lamination in that order from the anode side, wherein:

the luminescent layer comprises a spiro compound represented by the following Structural formula (1) or a derivative thereof; and

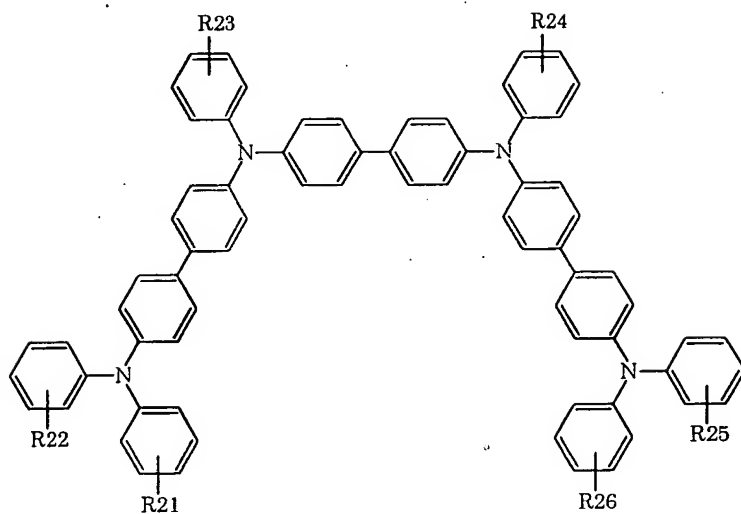
the hole transportation layer comprises triphenylamine tetramer represented by the following Structural formula (2)

or the following Structural formula (3), or a derivative thereof:

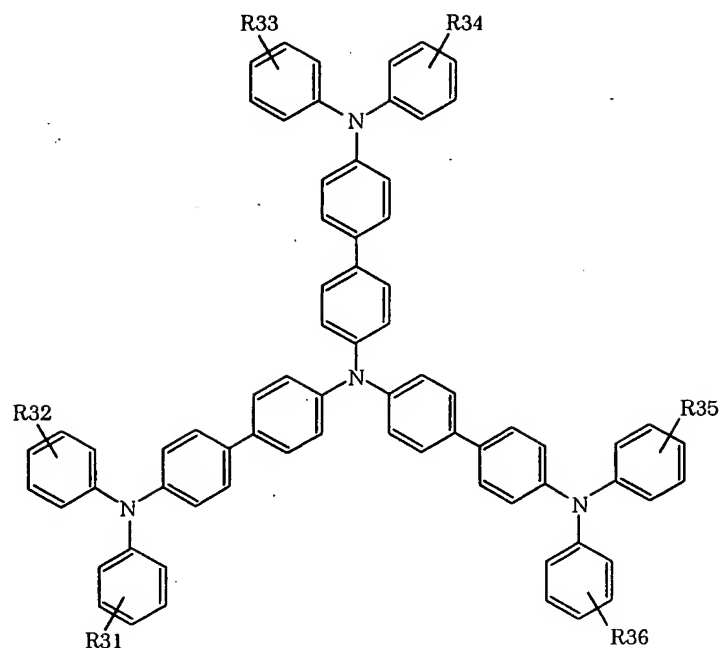
Structural formula (1)



Structural formula (2)



Structural formula (3)

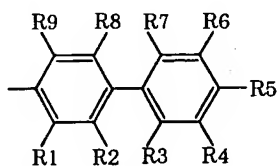


where Ar1 to Ar4 in the Structural formula (1) independently represent a biphenyl group, substituted biphenyl group, naphthyl group, substituted naphthyl group, anthryl group, or substituted anthryl group, and R21 to R26 in the Structural formula (2) and R31 to R36 in the Structural formula (3) independently represent hydrogen, alkyl group having the number of carbon atoms of 1 to 12, cycloalkyl group, aryl group having the number of carbon atoms of 5 to 28, or substituted aryl group.

10. The display unit according to Claim 9, wherein at least one of Ar1 to Ar4 in the Structural formula (1) is a

biphenyl group or substituted biphenyl group represented by the following Structural formula (4):

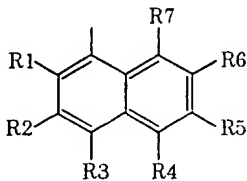
Structural formula (4)



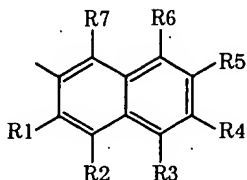
where R1 to R9 in the Structural formula (4) independently represent hydrogen, alkyl group having the number of carbon atoms of 1 to 12, cycloalkyl group, aryl group having the number of carbon atoms of 5 to 28, or substituted aryl group.

11. The display unit according to Claim 9, wherein at least one of Ar1 to Ar4 in the Structural formula (1) is a naphthyl group or substituted naphthyl group represented by the following Structural formula (5) or Structural formula (6):

Structural formula (5)



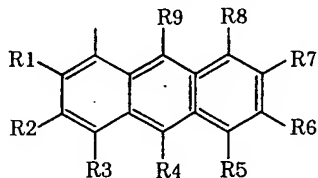
Structural formula (6)



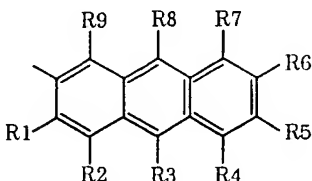
where R1 to R7 in the Structural formula (5) and Structural formula (6) independently represent hydrogen, alkyl group having the number of carbon atoms of 1 to 12, cycloalkyl group, aryl group having the number of carbon atoms of 5 to 28, or substituted aryl group.

12. The display unit according to Claim 9, wherein at least one of Ar1 to Ar4 in the Structural formula (1) is an anthryl group or substituted anthryl group represented by the following Structural formula (7), Structural formula (8), or Structural formula (9):

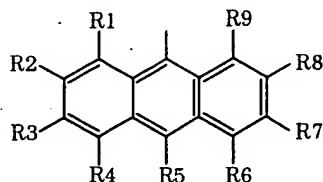
Structural formula (7)



Structural formula (8)



Structural formula (9)



where R1 to R9 in the Structural formula (7), Structural formula (8), and Structural formula (9) independently represent hydrogen, alkyl group having the number of carbon atoms of 1 to 12, cycloalkyl group, aryl group having the number of carbon atoms of 5 to 28, or substituted aryl group.

13. The display unit according to Claim 9, wherein the organic electroluminescent devices are provided at a part of the plurality of pixels as blue-emitting elements.

14. The display unit according to Claim 9, wherein an electron transportation layer is provided between the cathode and the luminescent layer.

15. The display unit according to Claim 9, wherein at least one of the anode and cathode comprises a transmission material.

16. The display unit according to Claim 9, wherein the cathode comprises a transmission material.

17. The display unit according to Claim 16, wherein the cathode comprises an alloy of magnesium and silver.

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L12 8688 S L3 NOT L5 FUL
SAV L12 THO353/A

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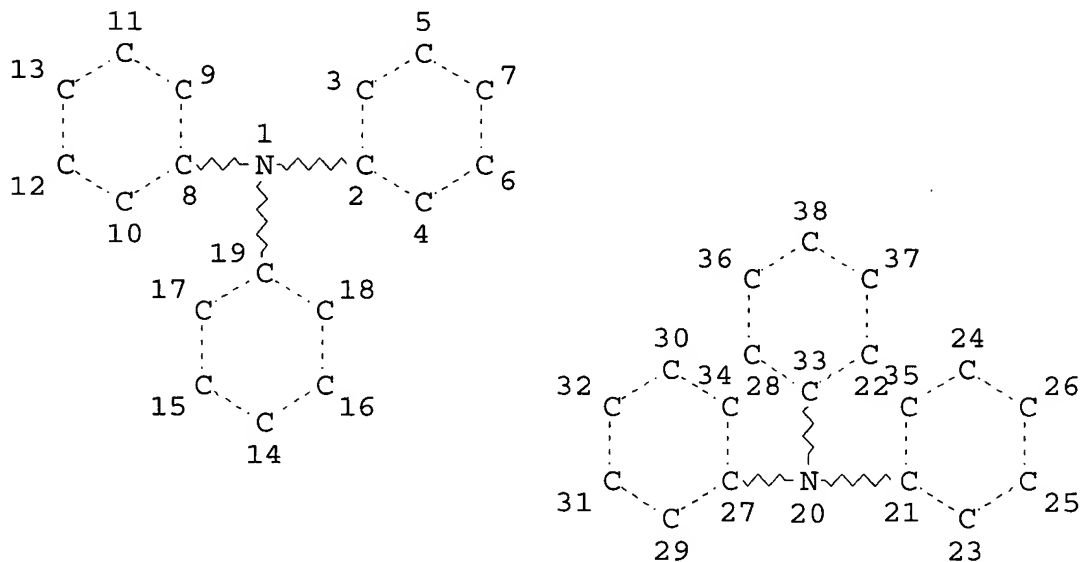
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L20 1239 S L19 AND 11<NRS

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L23 6 S L21 AND L22
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L26 39 S L17 NOT (L24 OR L25)
L27 23 S L26 AND (1907-2000/PY OR 1907-2000/PRY)

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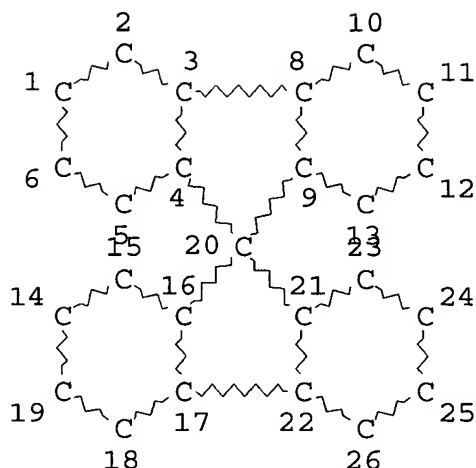
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STEREO ATTRIBUTES: NONE
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L1 STR



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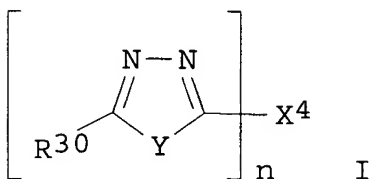
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=> d l24 1-4 ibib abs hitstr hitind

L24 ANSWER 1 OF 4 HCA COPYRIGHT 2003 ACS
 ACCESSION NUMBER: 138:278145 HCA
 TITLE: Organic **electroluminescent** devices
 INVENTOR(S): Tominaga, Takeshi; Makiyama, Akira; Kohama, Toru
 PATENT ASSIGNEE(S): Toray Industries, Inc., Japan
 SOURCE: Jpn. Kokai Tokkyo Koho, 11 pp.
 CODEN: JKXXAF
 DOCUMENT TYPE: Patent
 LANGUAGE: Japanese
 FAMILY ACC. NUM. COUNT: 1
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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JP 2003109768 A2 20030411 JP 2002-214876 20020724
 PRIORITY APPLN. INFO.: JP 2001-224359 A 20010725
 OTHER SOURCE(S): MARPAT 138:278145
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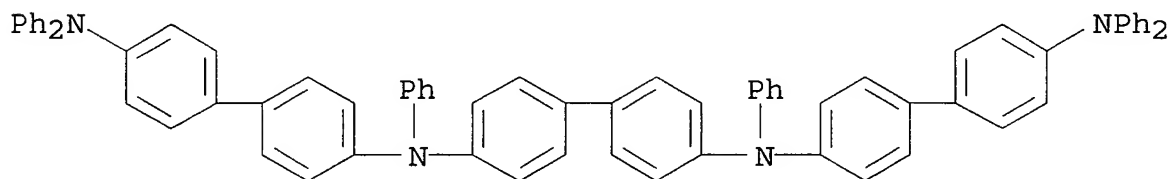


AB The devices comprise a pair of electrodes interposing an org. **electroluminescent** laminate comprising (1) (Ph₂N)_nX₁, where each Ph ring can be substituted by R₁-10, (2) -(9-R₁₁-1H-carbazole-3,6-yl)_n-, (3) (Ph₂C:C)_nX₂, where each ring can be substituted by R₁₂-21, (4) (9,10-diazaphenanthrene)_nX₃, and (5) I [R₁-30 = H, alkyl, aryl, alkoxy; X₁-4 = single bond, alkyl, cycloalkyl, alkylene, aryl, heterocyclic, silyl, ether, thioether; m > 4; n > 2] and having a sublimation characteristic, a triplet energy level, and a mol. wt. > 600.

IT 167218-46-4 296269-66-4, 2,2',7,7'-Tetrakis(2,2-diphenylvinyl)spiro-9,9'-bifluorene 365999-68-4
 503307-40-2 503307-41-3 503307-42-4
 (structure and property of org. **electroluminescent** devices)

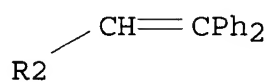
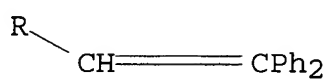
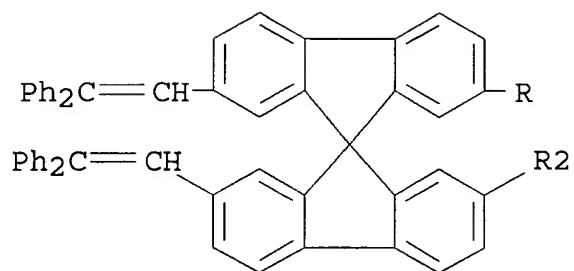
RN 167218-46-4 HCA

CN [1,1'-Biphenyl]-4,4'-diamine, N,N'-bis[4'-(diphenylamino)[1,1'-biphenyl]-4-yl]-N,N'-diphenyl- (9CI) (CA INDEX NAME)



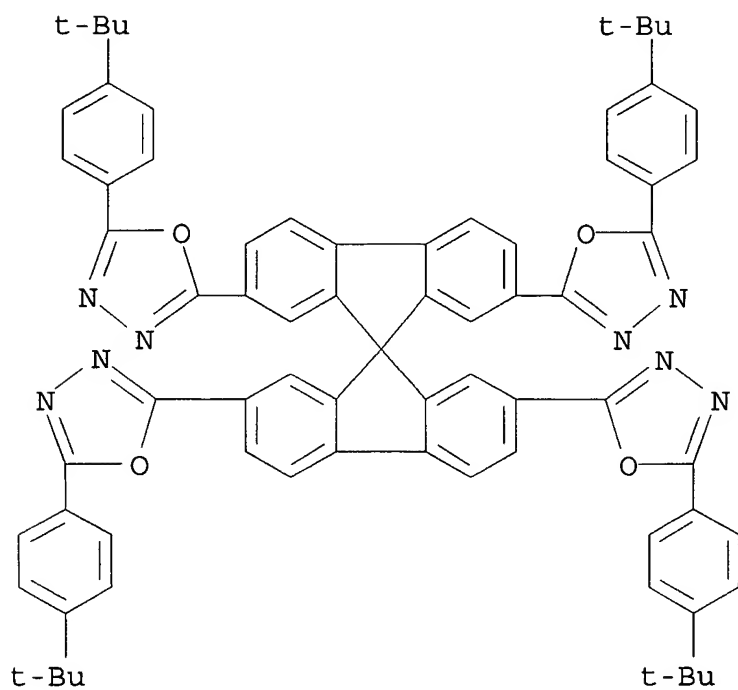
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CN 9,9'-Spirobi[9H-fluorene], 2,2',7,7'-tetrakis(2,2-diphenylethenyl)- (9CI) (CA INDEX NAME)



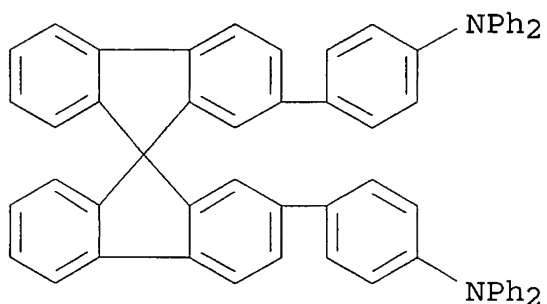
RN 365999-68-4 HCA

CN 1,3,4-Oxadiazole, 2,2',2'',2'''-(9,9'-spirobi[9H-fluorene]-2,2',7,7'-tetrayl)tetrakis[5-[4-(1,1-dimethylethyl)phenyl]-(9CI) (CA INDEX NAME)



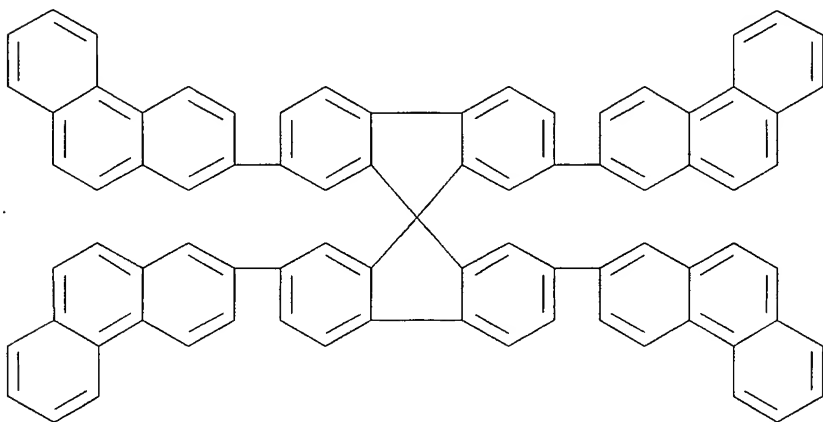
RN 503307-40-2 HCA

CN Benzenamine, 4,4'-(9,9'-spirobi[9H-fluorene]-2,2'-diyl)bis[N,N-diphenyl- (9CI) (CA INDEX NAME)



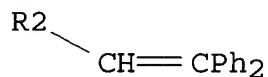
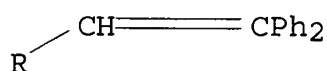
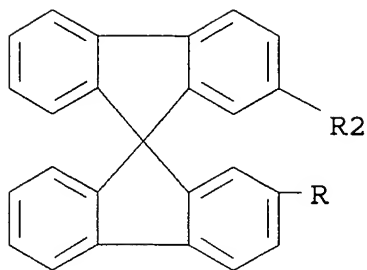
RN 503307-41-3 HCA

CN 9,9'-Spirobi[9H-fluorene], 2,2',7,7'-tetra-2-phenanthrenyl- (9CI)
(CA INDEX NAME)



RN 503307-42-4 HCA

CN 9,9'-Spirobi[9H-fluorene], 2,2'-bis(2,2-diphenylethenyl)- (9CI) (CA INDEX NAME)



IC ICM H05B033-14
 ICS C09K011-06; H05B033-22
 CC 73-5 (Optical, Electron, and Mass Spectroscopy and Other Related Properties)
 ST structure property org **electroluminescent** device
 IT Materials
 (org.; structure and property of org. **electroluminescent** devices)
 IT Anodes
 Cathodes
 Electric energy
Electroluminescent devices
 Glass substrates
 Luminescent substances
 Sublimation
 (structure and property of org. **electroluminescent** devices)
 IT 2085-33-8, Tris(8-quinolinolato)aluminum 4733-39-5,
 2,9-Dimethyl-4,7-diphenyl-1,10-phenanthroline 50926-11-9, ITO
 58328-31-7, 4,4'-Bis(N-carbazolyl)biphenyl 94928-86-6
 123847-85-8, .alpha.-NPD 167218-46-4 296269-66-4
 , 2,2',7,7'-Tetrakis(2,2-diphenylvinyl)spiro-9,9'-bifluorene
 365999-68-4 503307-40-2 503307-41-3
 503307-42-4
 (structure and property of org. **electroluminescent** devices)
 L24 ANSWER 2 OF 4 HCA COPYRIGHT 2003 ACS
 ACCESSION NUMBER: 137:208193 HCA
 TITLE: Organic **electroluminescent** device and

display unit
 INVENTOR(S): Ueda, Naoyuki; Takada, Ichinori; Shibamura,
 Tetsuo; Ichimura, Mari; Tamura, Shinichiro
 PATENT ASSIGNEE(S): Japan
 SOURCE: U.S. Pat. Appl. Publ., 24 pp.
 CODEN: USXXCO
 DOCUMENT TYPE: Patent
 LANGUAGE: English
 FAMILY ACC. NUM. COUNT: 1
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 2002122900	A1	20020905	US 2002-68353	20020206
JP 2002313579	A2	20021025	JP 2002-6851	20020116
PRIORITY APPLN. INFO.:			JP 2001-29533	A 20010206
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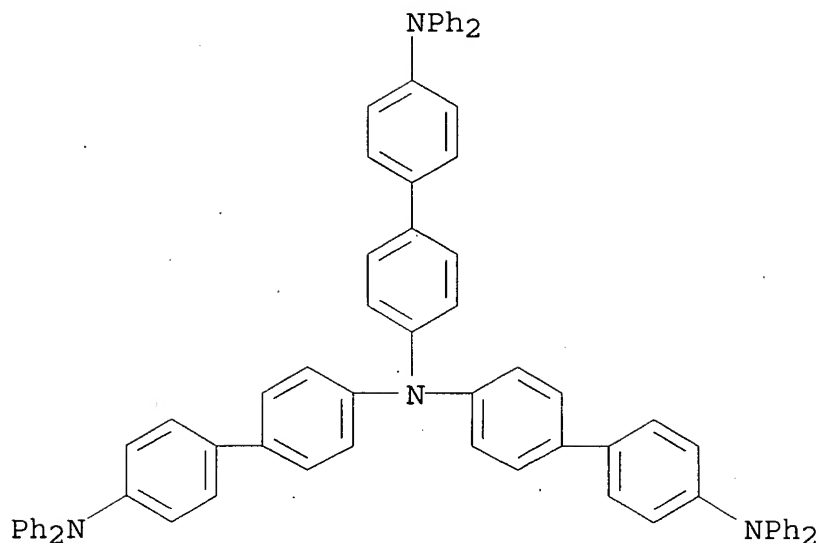
OTHER SOURCE(S): MARPAT 137:208193

AB Org. **electroluminescent** devices comprising at least a hole transportation layer and a luminescent layer held between an anode and a cathode are described in which the luminescent layer comprises a spiro compd. represented by the general formula 2,2',7,7'-tetrakis(Ar)-9,9'-spirobifluorene; and the hole transportation layer comprises a triphenylamine tetramer represented by the general formulas (R21-C6H4)(R22-C6H4)N(p-C6H4)2N(R23-C6H4)(p-C6H4)2(R24-C6H4)N(p-C6H4)2N(R25-C6H4)(R26-C6H4) or [(R31-C6H4)(R32-C6H4)N(p-C6H4)2]3N (Ar = independently selected a biphenyl, substituted biphenyl, naphthyl, substituted naphthyl, anthryl, or substituted anthryl groups; and R21-26 and R31-32 = independently selected H, C1-12 alkyl, cycloalkyl, C5-a8 aryl, or substituted aryl groups). Displays employing the devices are also described.

IT 128396-99-6 167218-46-4 171408-93-8
 454182-25-3 454182-26-4 454182-27-5
 454182-28-6 454182-29-7

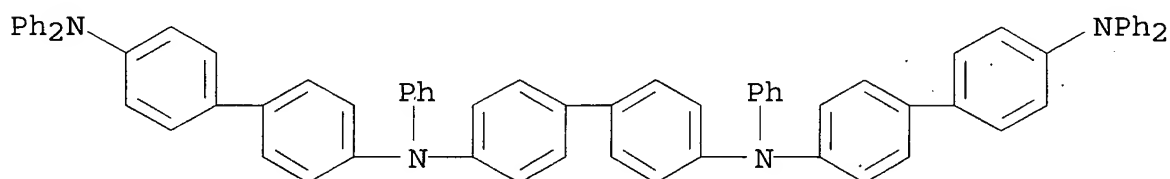
(org. **electroluminescent** devices using spiro compd.-based luminescent layers and triphenylamine tetramer-based hole-transport layers and displays using them)

RN 128396-99-6 HCA
 CN [1,1'-Biphenyl]-4,4'-diamine, N,N-bis[4'-(diphenylamino)[1,1'-biphenyl]-4-yl]-N',N'-diphenyl- (9CI) (CA INDEX NAME)



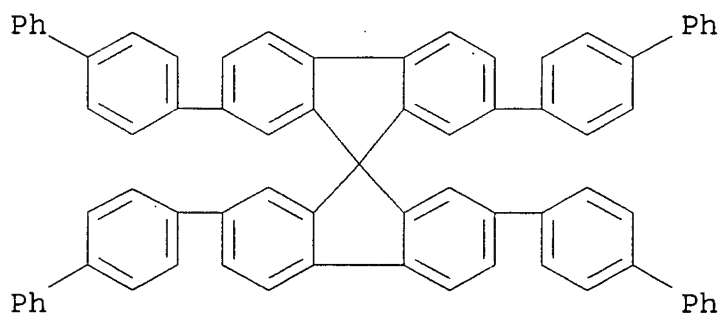
RN 167218-46-4 HCA

CN [1,1'-Biphenyl]-4,4'-diamine, N,N'-bis[4'-(diphenylamino)[1,1'-biphenyl]-4-yl]-N,N'-diphenyl- (9CI) (CA INDEX NAME)



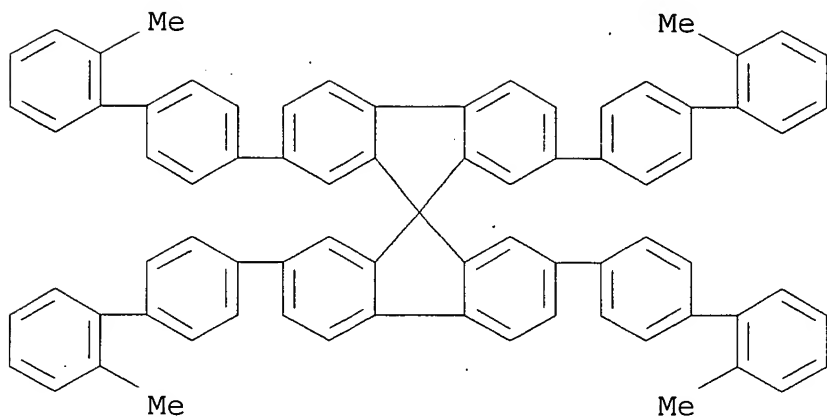
RN 171408-93-8 HCA

CN 9,9'-Spirobi[9H-fluorene], 2,2',7,7'-tetrakis([1,1'-biphenyl]-4-yl)- (9CI) (CA INDEX NAME)

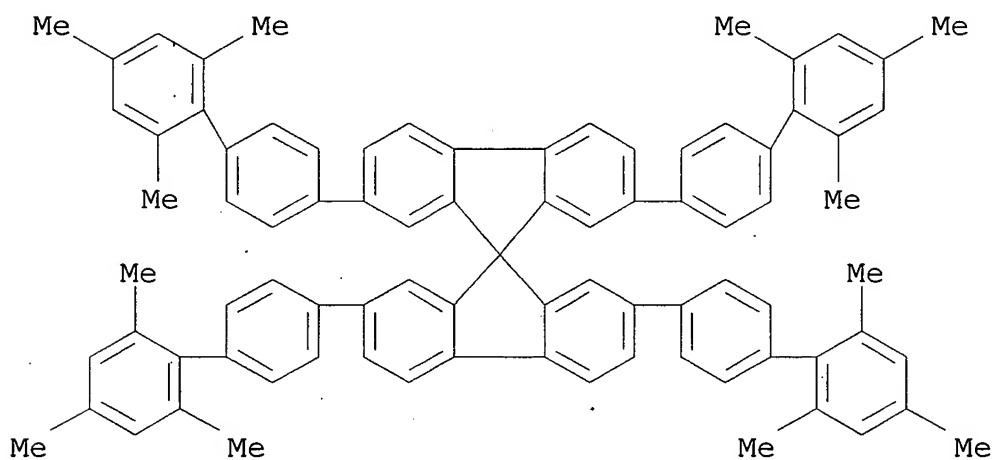


RN 454182-25-3 HCA

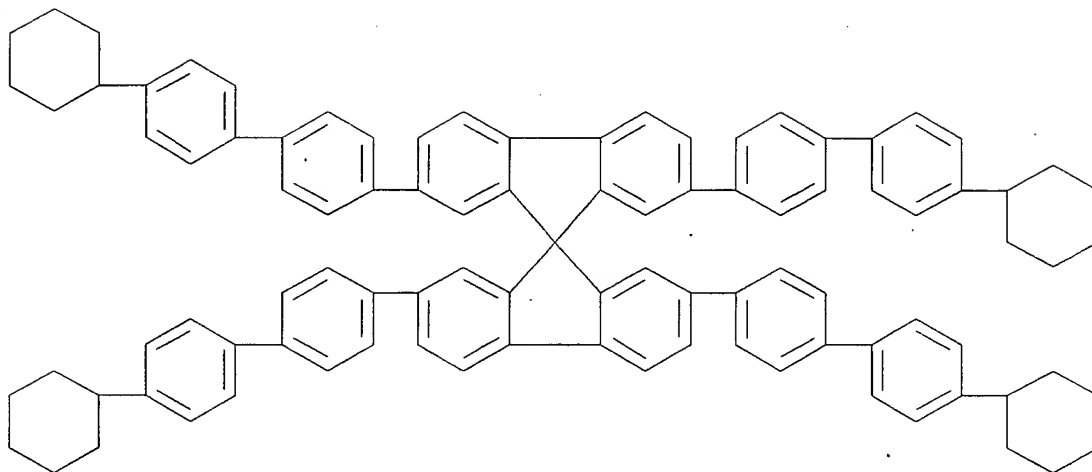
CN 9,9'-Spirobi[9H-fluorene], 2,2',7,7'-tetrakis(2'-methyl[1,1'-biphenyl]-4-yl)- (9CI) (CA INDEX NAME)



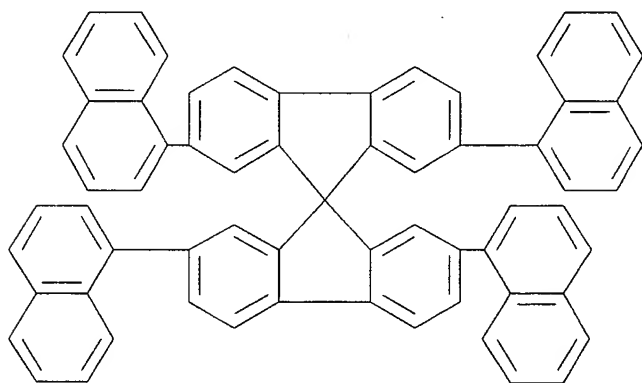
RN 454182-26-4 HCA
 CN 9,9'-Spirobi[9H-fluorene], 2,2',7,7'-tetrakis(2',4',6'-trimethyl[1,1'-biphenyl]-4-yl)- (9CI) (CA INDEX NAME)



RN 454182-27-5 HCA
 CN 9,9'-Spirobi[9H-fluorene], 2,2',7,7'-tetrakis(4'-cyclohexyl[1,1'-biphenyl]-4-yl)- (9CI) (CA INDEX NAME)

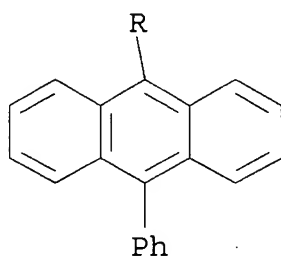
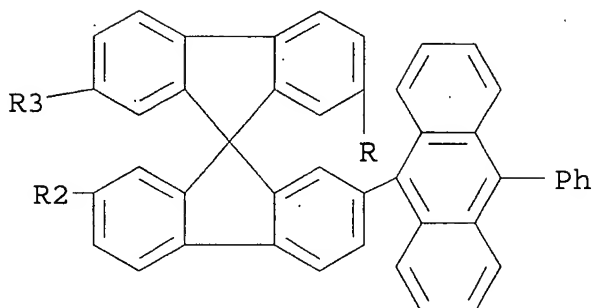


RN 454182-28-6' HCA
CN 9,9'-Spirobi[9H-fluorene], 2,2',7,7'-tetra-1-naphthalenyl- (9CI)
(CA INDEX NAME)

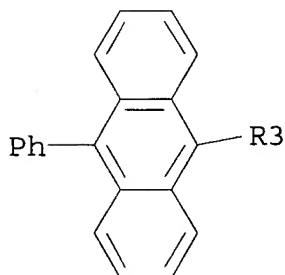
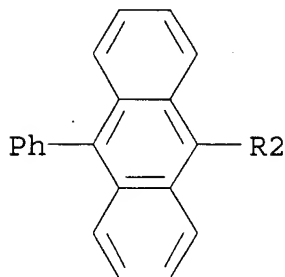


RN 454182-29-7 HCA
CN 9,9'-Spirobi[9H-fluorene], 2,2',7,7'-tetrakis(10-phenyl-9-anthracenyl)- (9CI) (CA INDEX NAME)

PAGE 1-A



PAGE 2-A



IC ICM G02F001-1335
ICS G11C013-00; H05B033-00
NCL 428001100
CC 73-11 (Optical, Electron, and Mass Spectroscopy and Other Related Properties)
Section cross-reference(s): 25, 74, 76
ST org **electroluminescent** device spiro compd triphenylamine tetramer; triphenylamine tetramer hole transport layer org **electroluminescent** device; spiro compd **luminescent** layer org **electroluminescent** device
IT **Electroluminescent** devices
(displays, org.; org. **electroluminescent** devices using spiro compd.-based luminescent layers and triphenylamine tetramer-based hole-transport layers and displays using them)
IT **Luminescent** screens
(**electroluminescent**, org.; org. **electroluminescent** devices using spiro compd.-based luminescent layers and triphenylamine tetramer-based hole-transport layers and displays using them)
IT Spiro compounds
(org. **electroluminescent** devices using spiro compd.-based luminescent layers and triphenylamine tetramer-based hole-transport layers and displays using them)
IT **Electroluminescent** devices
(org.; org. **electroluminescent** devices using spiro compd.-based luminescent layers and triphenylamine tetramer-based

hole-transport layers and displays using them)
IT 2085-33-8, Tris(8-hydroxyquinolinato)aluminum 37271-44-6
128396-99-6 167218-46-4 171408-93-8
185690-41-9, 4,4',4''-Tris(2-naphthylphenylamino)triphenylamine
454182-25-3 454182-26-4 454182-27-5
454182-28-6 454182-29-7
(org. **electroluminescent** devices using spiro
compd.-based luminescent layers and triphenylamine tetramer-based
hole-transport layers and displays using them)

L24 ANSWER 3 OF 4 HCA COPYRIGHT 2003 ACS
ACCESSION NUMBER: 136:393041 HCA
TITLE: Organic **electroluminescent** devices
INVENTOR(S): Toguchi, Satoru; Ishikawa, Hitoshi; Tada,
Hiroshi; Oda, Atsushi
PATENT ASSIGNEE(S): Japan
SOURCE: U.S. Pat. Appl. Publ., 87 pp.
CODEN: USXXCO
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 2002058156	A1	20020516	US 2001-985657	20011105
JP 2002151263	A2	20020524	JP 2000-339603	20001107
JP 2002151264	A2	20020524	JP 2000-339604	20001107
JP 2002151265	A2	20020524	JP 2000-339605	20001107
PRIORITY APPLN. INFO.:			JP 2000-339603 A	20001107
			JP 2000-339604 A	20001107
			JP 2000-339605 A	20001107

OTHER SOURCE(S): MARPAT 136:393041

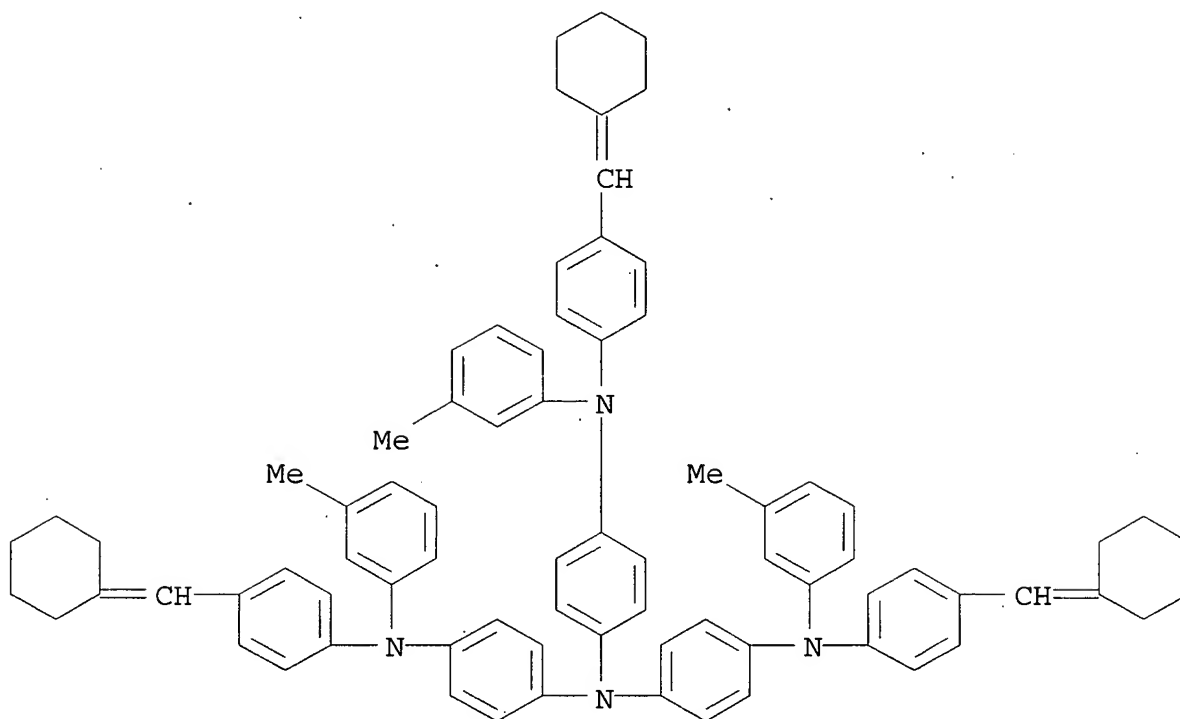
AB Org. **electroluminescent** devices comprising an anode; a
cathode; and .gtoreq.1 org. thin film layers including a
light-emitting layer sandwiched between said anode
and said cathode ADIW .gtoreq.1 org. thin film layer contains a
compd. including an (un)substituted cyclohexylidenemethine group.

IT 426218-52-2P 426218-53-3P 426218-54-4P
426218-56-6P 426218-59-9P

(org. **electroluminescent** devices employing
cyclohexylidenemethine derivs.)

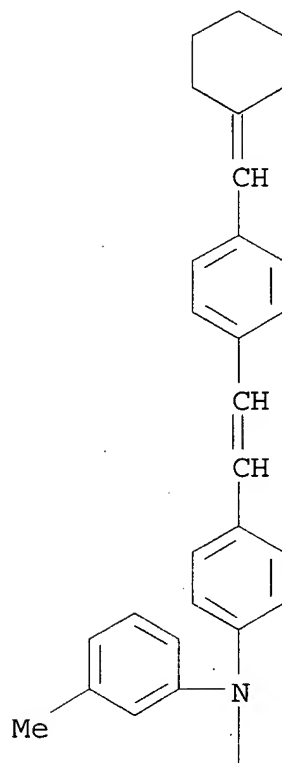
RN 426218-52-2 HCA

CN 1,4-Benzenediamine, N-[4-(cyclohexylidenemethyl)phenyl]-N',N'-bis[4-
[[4-(cyclohexylidenemethyl)phenyl](3-methylphenyl)amino]phenyl]-N-(3-
methylphenyl)- (9CI) (CA INDEX NAME)

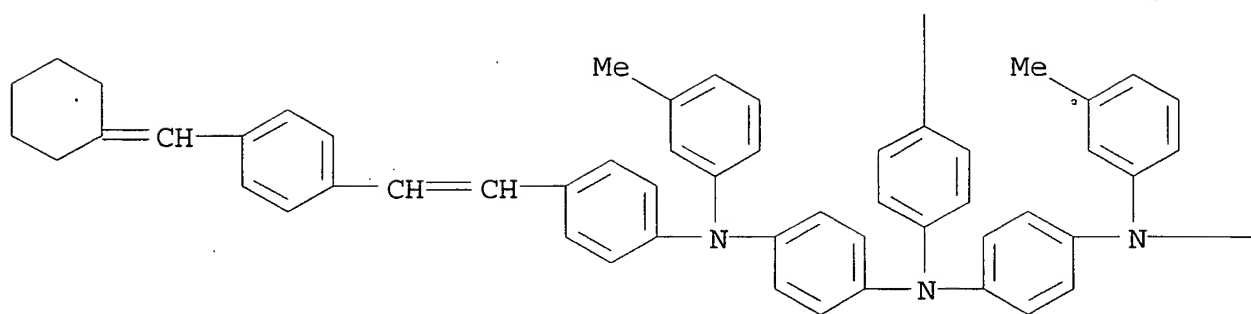


RN 426218-53-3 HCA
CN 1,4-Benzenediamine, N-[4-[2-[4-(cyclohexylidenemethyl)phenyl]ethenyl]
phenyl]-N',N'-bis[4-[[4-[2-[4-(cyclohexylidenemethyl)phenyl]ethenyl]
phenyl]](3-methylphenyl)amino]phenyl]-N-(3-methylphenyl)- (9CI) (CA
INDEX NAME)

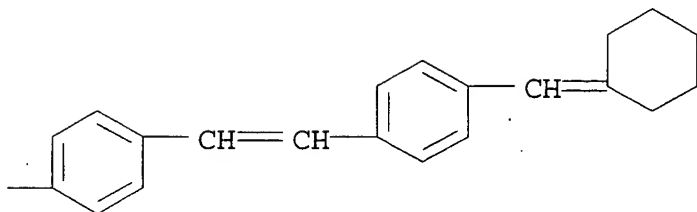
PAGE 1-A



PAGE 2-A

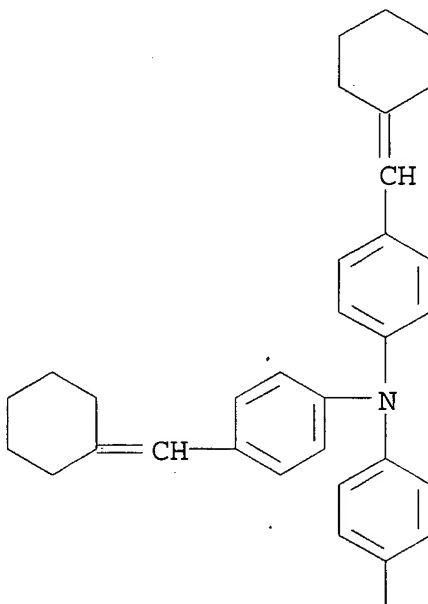


PAGE 2-B

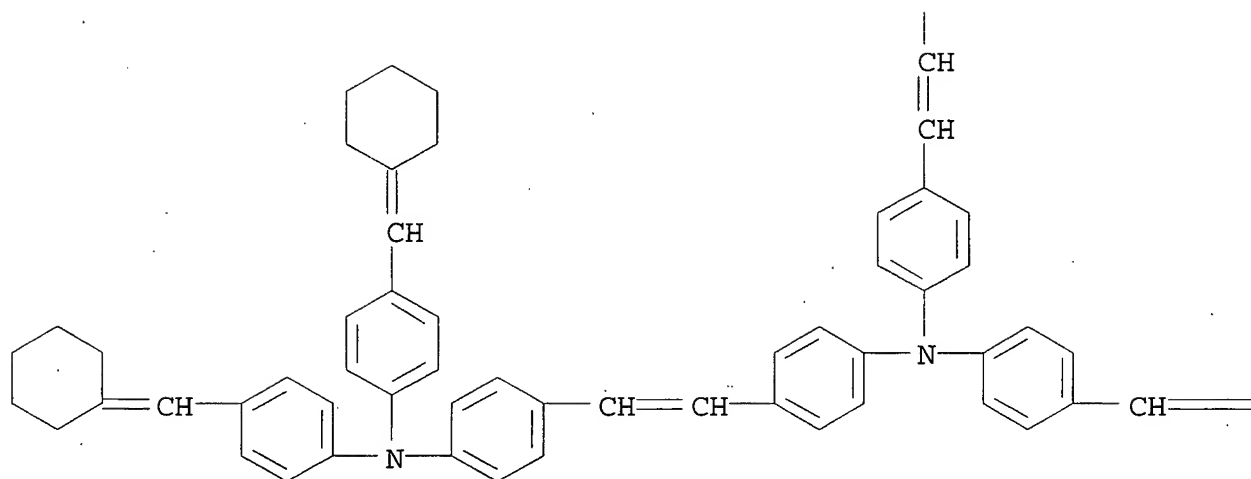


RN 426218-54-4 HCA
CN Benzenamine, 4-[2-[4-[bis[4-(cyclohexylidenemethyl)phenyl]amino]phenyl]ethenyl]-N,N-bis[4-[2-[4-[bis[4-(cyclohexylidenemethyl)phenyl]aminophenyl]ethenyl]phenyl]- (9CI) (CA INDEX NAME)

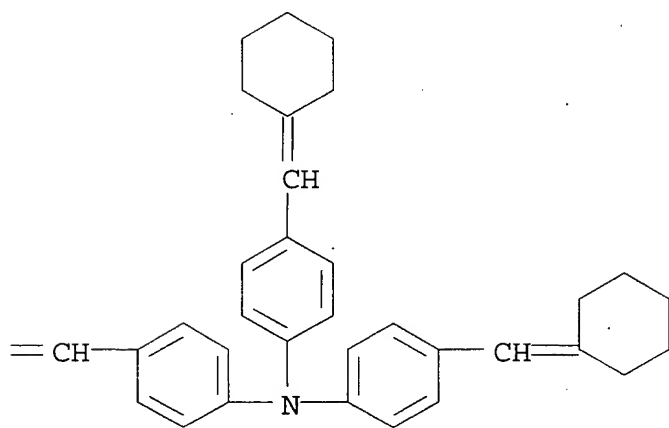
PAGE 1-A



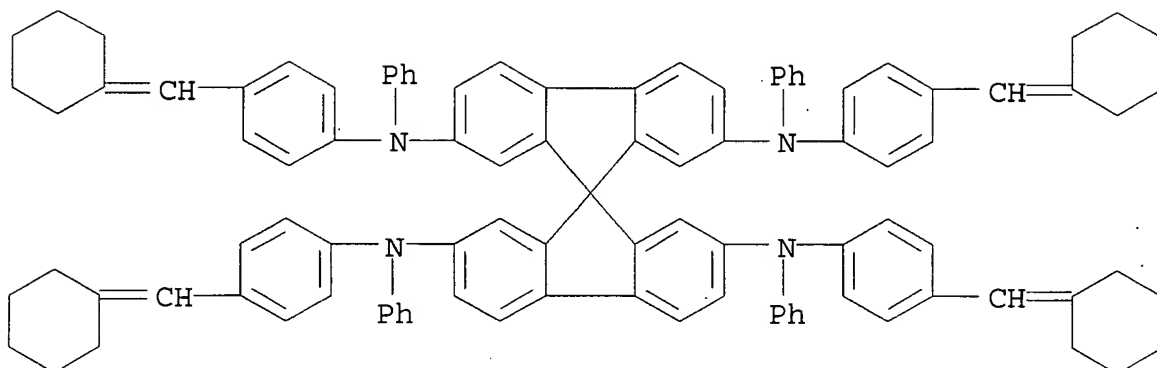
PAGE 2-A



PAGE 2-B



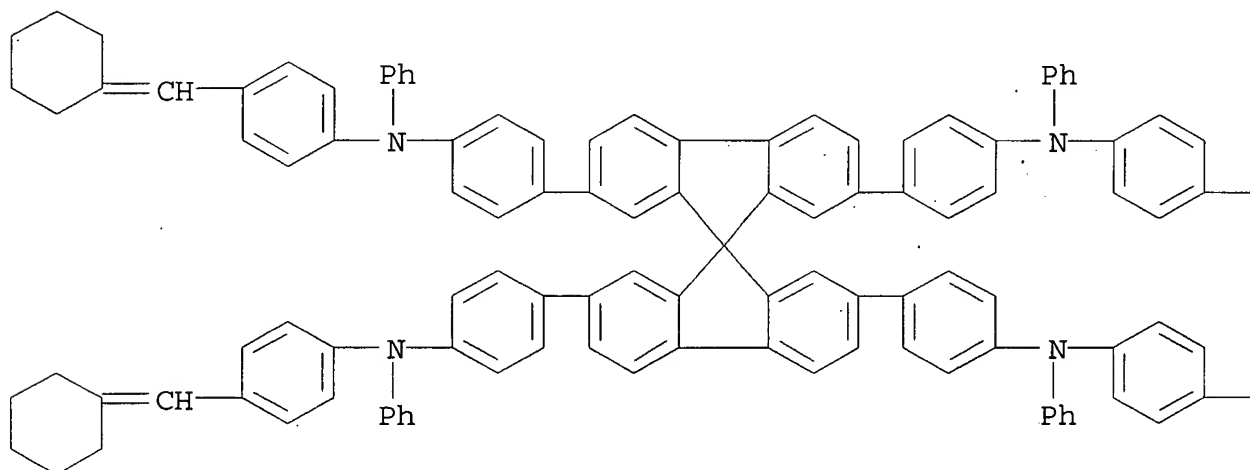
RN 426218-56-6 HCA
 CN 9,9'-Spirobi[9H-fluorene]-2,2',7,7'-tetramine, N,N',N'',N'''-
 tetrakis[4-(cyclohexylidenemethyl)phenyl]-N,N',N'',N'''-tetraphenyl-
 (9CI) (CA INDEX NAME)



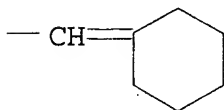
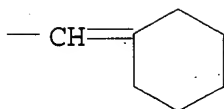
RN 426218-59-9 HCA

CN Benzenamine, 4,4',4'',4'''-(9,9'-spirobi[9H-fluorene]-2,2',7,7'-
tetrayl)tetrakis[N-[4-(cyclohexylidenemethyl)phenyl]-N-phenyl]- (9CI)
(CA INDEX NAME)

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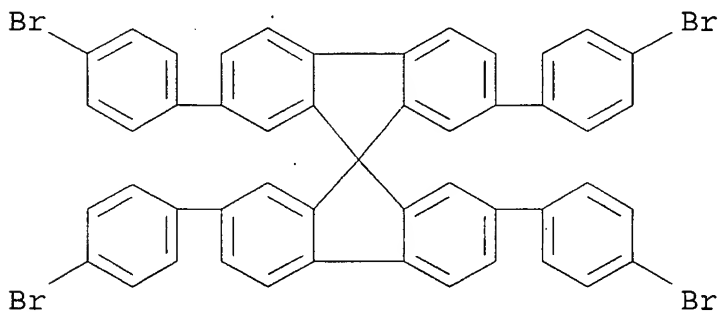
PAGE 1-B



IT 426218-58-8

(org. **electroluminescent** devices employing
cyclohexylidenemethine derivs.)

RN 426218-58-8 HCA

CN 9,9'-Spirobi[9H-fluorene], 2,2',7,7'-tetrakis(4-bromophenyl) - (9CI)
(CA INDEX NAME)

IC H05B033-12

NCL 428690000

CC 73-11 (Optical, Electron, and Mass Spectroscopy and Other Related
Properties)

Section cross-reference(s): 25, 76

ST org **electroluminescent** device cyclohexylidenemethine derivIT **Electroluminescent** devices(org.; org. **electroluminescent** devices employing
cyclohexylidenemethine derivs.)IT 2085-33-8, Alq3 15082-28-7, 2-(4-Biphenyl)-5-(4-t-butylphenyl)-
1,3,4-oxadiazole 37271-44-6 50926-11-9, ITO 61843-06-9
65181-78-4, N,N'-Diphenyl-N,N'-bis(3-methylphenyl)-1,1'-biphenyl-
4,4'-diamine 123847-85-8 150405-69-9 163226-12-8 181367-28-2

194214-31-8 194794-43-9 227939-49-3 426218-62-4 426218-63-5
(org. **electroluminescent** devices employing
cyclohexylidenemethine derivs.)

IT 7440-46-2, Cesium, uses
(org. **electroluminescent** devices employing
cyclohexylidenemethine derivs.)

IT 426218-12-4P 426218-13-5P 426218-14-6P 426218-15-7P
426218-16-8P 426218-17-9P 426218-18-0P 426218-19-1P
426218-20-4P 426218-21-5P 426218-22-6P 426218-23-7P
426218-24-8P 426218-25-9P 426218-26-0P 426218-27-1P
426218-28-2P 426218-30-6P 426218-31-7P 426218-32-8P
426218-33-9P 426218-34-0P 426218-35-1P 426218-36-2P
426218-37-3P 426218-38-4P 426218-40-8P 426218-41-9P
426218-42-0P 426218-44-2P 426218-46-4P 426218-47-5P
426218-49-7P 426218-50-0P **426218-52-2P**
426218-53-3P **426218-54-4P** 426218-55-5P
426218-56-6P **426218-59-9P** 426218-60-2P
426218-61-3P 426252-99-5P 426253-00-1P 426253-01-2P
(org. **electroluminescent** devices employing
cyclohexylidenemethine derivs.)

IT 62-53-3, Aniline, reactions 83-53-4, 1,4-Dibromonaphthalene
106-49-0, p-Toluidine, reactions 108-94-1, Cyclohexanone,
reactions 122-52-1, Triethyl phosphite 128-08-5,
N-Bromosuccinimide 523-27-3, 9,10-Dibromoanthracene 589-15-1,
4-Bromobenzyl bromide 589-17-3, .alpha.-Chloro-4-bromotoluene
626-39-1, 1,3,5-Tribromobenzene 4316-58-9, Tris(4-
bromophenyl)amine 19930-62-2 33861-11-9 56752-35-3,
3,9-Dibromoperylene 72393-15-8 97136-66-8 98327-87-8,
2,2'-Bis(diphenylphosphino)-1,1'-binaphthyl 121848-75-7,
10,10'-Dibromo-9,9'-bianthryl 128055-74-3, 2,2',7,7'-Tetrabromo-
9,9'-spirobifluorene 227010-27-7 252646-79-0 426218-07-7
426218-09-9 426218-29-3 426218-39-5 426218-57-7
426218-58-8 426252-98-4
(org. **electroluminescent** devices employing
cyclohexylidenemethine derivs.)

IT 57438-72-9P 72436-33-0P 426218-05-5P 426218-06-6P
426218-08-8P 426218-10-2P 426218-11-3P 426218-43-1P
426218-45-3P 426218-48-6P 426218-51-1P
(org. **electroluminescent** devices employing
cyclohexylidenemethine derivs.)

L24 ANSWER 4 OF 4 HCA COPYRIGHT 2003 ACS

ACCESSION NUMBER: 132:285725 HCA

TITLE: Influence of hole transporting material on
device performance in organic **light-**
emitting diode

AUTHOR(S): Tokito, S.; Noda, K.; Shimada, K.; Inoue, S.-i.;
Kimura, M.; Sawaki, Y.; Taga, Y.

CORPORATE SOURCE: TOYOTA Central Research & Development Labs.,
Inc., Nagakute-cho, Aichi, Japan

SOURCE: Thin Solid Films (2000), 363(1,2), 290-293
CODEN: THSFAP; ISSN: 0040-6090

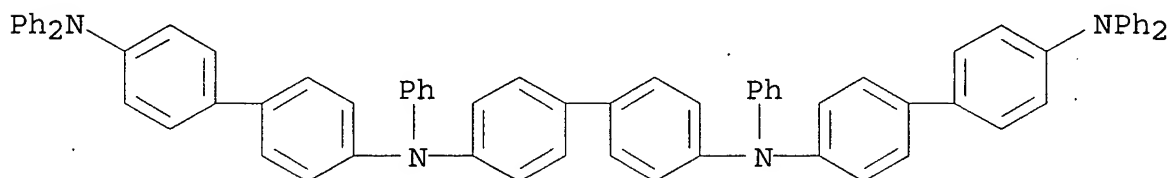
PUBLISHER: Elsevier Science S.A.
 DOCUMENT TYPE: Journal
 LANGUAGE: English

AB The authors have studied the influence of hole transporting material on the **electroluminescence** characteristics in two-layer devices based on tris(8-quinolinolato) Al. Five hole transporting materials including two novel materials were used. No difference in turn-on voltages for **light emission** was seen in the devices fabricated on In-Sn-oxide treated by Ar/O plasma, and a high luminance of 10000 cd/m² was achieved at an operating voltage around 10 V. However, the photometric efficiency depended on the hole transporting material. High photometric efficiency of 6.1 cd/A and high luminous efficiency of 3.6 lm/W at a luminance of 300 cd/m² were obtained in one of the devices.

IT 167218-46-4 244301-19-7
 (influence of hole transporting material on device performance in org. **light-emitting diode**)

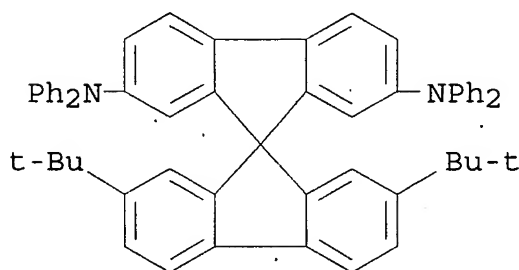
RN 167218-46-4 HCA

CN [1,1'-Biphenyl]-4,4'-diamine, N,N'-bis[4'-(diphenylamino)[1,1'-biphenyl]-4-yl]-N,N'-diphenyl- (9CI) (CA INDEX NAME)



RN 244301-19-7 HCA

CN 9,9'-Spirobi[9H-fluorene]-2,7-diamine, 2',7'-bis(1,1-dimethylethyl)-N,N,N',N'-tetraphenyl- (9CI) (CA INDEX NAME)



CC 73-5 (Optical, Electron, and Mass Spectroscopy and Other Related Properties)

Section cross-reference(s): 76

ST hole transporting layer **electroluminescent** device org LED

IT Plasma

(influence of hole transporting material and plasma treatment on device performance in org. **light-emitting diode**)

IT **Electroluminescent** devices
Luminescence, **electroluminescence**
(influence of hole transporting material on device performance in
org. **light-emitting** diode)

IT Hole (electron)
(transporting layer for; influence of hole transporting material
on device performance in org. **light-emitting**
diode)

IT 50926-11-9, Indium tin oxide
(influence of hole transporting material on device performance in
org. **light-emitting** diode)

IT 2085-33-8, Aluminum tris(8-hydroxyquinolino) 65181-78-4
123847-85-8 167218-46-4 244301-19-7
261517-63-9
(influence of hole transporting material on device performance in
org. **light-emitting** diode)

IT 7440-37-1, Argon, uses 7782-44-7, Oxygen, uses
(plasma treatment; influence of hole transporting material and
plasma treatment on device performance in org. **light-**
emitting diode)

REFERENCE COUNT: 16 THERE ARE 16 CITED REFERENCES AVAILABLE
FOR THIS RECORD. ALL CITATIONS AVAILABLE
IN THE RE FORMAT

=> d 125 1-2 ti

L25 ANSWER 1 OF 2 HCA COPYRIGHT 2003 ACS
TI High electron-mobility and high ON/OFF-current-ratio organic
thin-film transistors

L25 ANSWER 2 OF 2 HCA COPYRIGHT 2003 ACS
TI Organic thin film transistor

=> d 127 1-23 cbib abs hitstr hitind

L27 ANSWER 1 OF 23 HCA COPYRIGHT 2003 ACS
137:70359 Organic **light-emitting** devices containing
a region or a mixed layer provided for lowering energy barriers at
interfaces between the organic layers, and electronic devices
employing the **light-emitting** devices. Seo,
Satoshi; Yamazaki, Shunpei (SEL Semiconductor Energy Laboratory Co.,
Ltd., Japan). Eur. Pat. Appl. EP 1220339 A2 20020703, 78 pp.
DESIGNATED STATES: R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI,
LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR.
(English). CODEN: EPXXDW. APPLICATION: EP 2001-130487 20011220.
PRIORITY: JP 2000-400730 20001228; JP 2001-45847 20010221.

AB **Light emitting** devices are described which
comprise at least a first layer comprising a first org. compd.; and
a second layer comprising a second org. compd. which is different

from the first org. compd., where a region or a mixed layer comprising the first org. compd. and the second org. compd. between the first layer and the second layer is provided for lowering energy barriers at interfaces between the org. layers. The devices may contain hole-injecting, hole-transporting, electron-transporting, electron-injecting and **light-emitting** layers as org. compd. layers, and may have more than one regions or mixed layers. Electronic devices employing the **light-emitting** devices are also discussed.

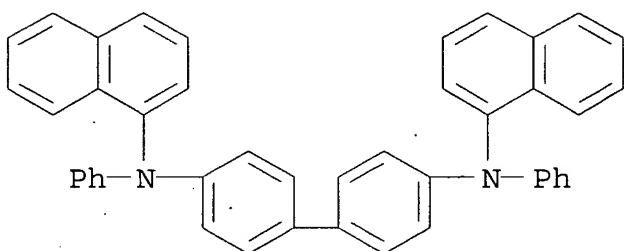
IT 123847-85-8, 4,4'-Bis[N-(1-naphthyl)-N-phenylamino]biphenyl

124729-98-2, 4,4',4'''-Tris [N-(3-methylphenyl)-N-phenylamino]triphenylamine

(hole-transporting layer; fabrication of **light-emitting** devices contg. mixed layer lowering energy barriers at interfaces between org. layers and contg.)

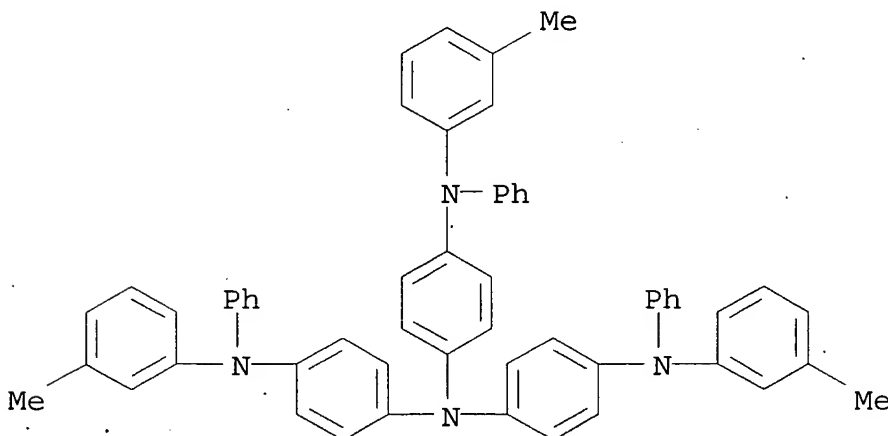
RN 123847-85-8 HCA

CN [1,1'-Biphenyl]-4,4'-diamine, N,N'-di-1-naphthalenyl-N,N'-diphenyl- (9CI) (CA INDEX NAME)



RN 124729-98-2 HCA

CN 1,4-Benzenediamine, N-(3-methylphenyl)-N',N'-bis[4-[(3-methylphenyl)phenylamino]phenyl]-N-phenyl- (9CI) (CA INDEX NAME)



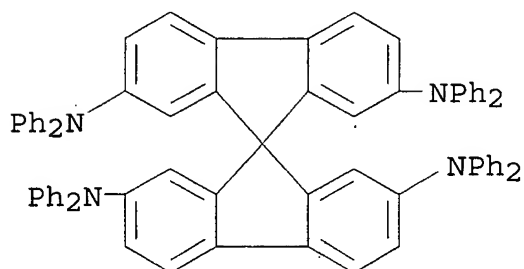
IT 189363-47-1

(hole-transporting layer; fabrication of **light-emitting** devices contg. mixed layer lowering energy

barriers at interfaces between org. layers and contg. spiro-TAD)

RN 189363-47-1 HCA

CN 9,9'-Spirobi[9H-fluorene]-2,2',7,7'-tetramine,
N,N,N',N',N'',N'',N''',N''''-octaphenyl- (9CI) (CA INDEX NAME)

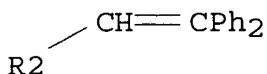
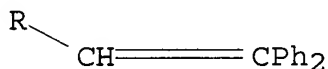
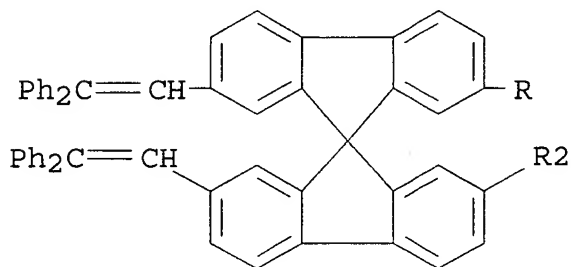


IT 296269-66-4

(light-emitting layer; fabrication of
light-emitting devices contg. mixed layer
lowering energy barriers at interfaces between org. layers and
contg.)

RN 296269-66-4 HCA

CN 9,9'-Spirobi[9H-fluorene], 2,2',7,7'-tetrakis(2,2-diphenylethenyl)-
(9CI) (CA INDEX NAME)



IC ICM H01L051-20

CC 73-11 (Optical, Electron, and Mass Spectroscopy and Other Related
Properties)

Section cross-reference(s): 74, 76

ST org **electroluminescent** device mixed layer interface energy
decrease; electronic device **OLED** mixed layer interface

- energy decrease
- IT LUMO (molecular orbital)
(HOMO gap; **light-emitting** devices contg. a region or a mixed layer provided for lowering)
- IT HOMO (molecular orbital)
(LUMO gap; **light-emitting** devices contg. a region or a mixed layer provided for lowering)
- IT Chemical chains
(conjugated, hole- or electron-injection regions; fabrication of **light-emitting** devices contg. mixed layer lowering energy barriers at interfaces between org. layers and contg.)
- IT Polymers, uses
(conjugates, hole-injecting region; fabrication of **light-emitting** devices contg. mixed layer lowering energy barriers at interfaces between org. layers and contg.)
- IT Alkali metal compounds
Lewis bases
(electron-injecting region contg.; fabrication of **light-emitting** devices contg. mixed layer lowering energy barriers at interfaces between org. layers and contg.)
- IT Lewis acids
(hole-injecting region contg.; fabrication of **light-emitting** devices contg. mixed layer lowering energy barriers at interfaces between org. layers and contg.)
- IT Halogen compounds
(hole-injecting region of conjugated system doped with; fabrication of **light-emitting** devices contg. mixed layer lowering energy barriers at interfaces between org. layers and contg.)
- IT Excited triplet state
(**light emission** from; **light-emitting** devices contg. a region or a mixed layer provided for lowering energy barriers at interfaces between org. layers and involving)
- IT Electric apparatus
Electroluminescent devices
Electronic device fabrication
Interfacial energy
Optical imaging devices
(**light-emitting** devices contg. a region or a mixed layer provided for lowering energy barriers at interfaces between org. layers, and electronic devices employing **light-emitting** devices)
- IT 7439-93-2, Lithium, uses
(-doped bathophenanthroline electron-injection region; fabrication of **light-emitting** devices contg. mixed layer lowering energy barriers at interfaces between org. layers and contg.)
- IT 50926-11-9, ITO
(anode; fabrication of **light-emitting** devices contg. mixed layer lowering energy barriers at interfaces between

- org. layers and contg.)
- IT 7429-90-5, Aluminum, uses 11099-20-0 12798-95-7
(cathode; fabrication of **light-emitting**
devices contg. mixed layer lowering energy barriers at interfaces
between org. layers and contg.)
- IT 18115-70-3, Lithium acetyl acetonate, uses
(electron-injection layer; fabrication of **light-**
emitting devices contg. mixed layer lowering energy
barriers at interfaces between org. layers and contg.)
- IT 1662-01-7, Bathophenanthroline 2085-33-8, Alq3 150405-69-9, TAZ
(triazole derivative)
(electron-transporting layer; fabrication of **light-**
emitting devices contg. mixed layer lowering energy
barriers at interfaces between org. layers and contg.)
- IT 4733-39-5, Bathocuproine
(hole-blocking layer; fabrication of **light-**
emitting devices contg. mixed layer lowering energy
barriers at interfaces between org. layers and contg.)
- IT 147-14-8, Copper phthalocyanine
(hole-injection material; fabrication of **light-**
emitting devices contg. mixed layer lowering energy
barriers at interfaces between org. layers and contg.)
- IT 123847-85-8, 4,4'-Bis[N-(1-naphthyl)-N-phenylamino]biphenyl
124729-98-2, 4,4',4'''-Tris [N-(3-methylphenyl)-N-
phenylamino]triphenylamine
(hole-transporting layer; fabrication of **light-**
emitting devices contg. mixed layer lowering energy
barriers at interfaces between org. layers and contg.)
- IT 189363-47-1
(hole-transporting layer; fabrication of **light-**
emitting devices contg. mixed layer lowering energy
barriers at interfaces between org. layers and contg. spiro-TAD)
- IT 104934-50-1, Poly(3-hexyl)thiophene
(iodine-doped hole-injecting region; fabrication of **light**
-emitting devices contg. mixed layer lowering energy
barriers at interfaces between org. layers and contg.)
- IT 58328-31-7, 4,4'-N,N'-Dicarbazolylbiphenyl
(**light-emitting** layer dopant; fabrication of
light-emitting devices contg. mixed layer
lowering energy barriers at interfaces between org. layers and
contg.)
- IT 296269-66-4
(**light-emitting** layer; fabrication of
light-emitting devices contg. mixed layer
lowering energy barriers at interfaces between org. layers and
contg.)
- IT 146162-54-1
(**light-emitting** material host; fabrication of
light-emitting devices contg. mixed layer
lowering energy barriers at interfaces between org. layers and
contg.)
- IT 51325-91-8, 4-(Dicyanomethylene)-2-methyl-6-(p-dimethylaminostyryl)-

4H-pyran 94928-86-6, Tris (2-phenylpyridine) iridium
(**light-emitting** material; fabrication of
light-emitting devices contg. mixed layer
lowering energy barriers at interfaces between org. layers and
contg.)

IT 14362-44-8, Iodine, atomic, uses
(polymer hole-injecting region doped with; fabrication of
light-emitting devices contg. mixed layer
lowering energy barriers at interfaces between org. layers and
contg.)

L27 ANSWER 2 OF 23 HCA COPYRIGHT 2003 ACS

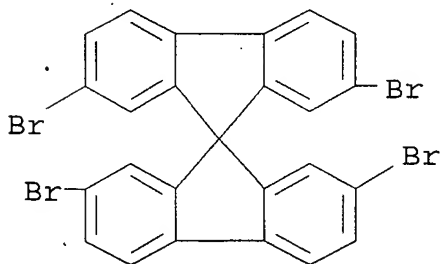
137:63354 Spiro compounds based on boron or aluminum and the use of the same in the electronics industry. Stoessel, Philipp; Spreitzer, Hubert; Becker, Heinrich; Drott, Jacqueline (Covion Organic Semiconductors G.m.b.H., Germany). PCT Int. Appl. WO 2002051850 A1 20020704, 28 pp. DESIGNATED STATES: W: CN, JP, KR, US; RW: AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR. (German). CODEN: PIXXD2. APPLICATION: WO 2001-EP15177 20011220. PRIORITY: EP 2000-128292 20001222.

AB The invention relates to substituted spiro compds. based on boron or aluminum and the use of the same in the electronics industry. Thus, lithiation of 2,7,2',7'-tetrabromo-9,9'-spirobifluorene with t-BuLi in THF followed by treatment with fluorodimesitylborane gave 55-65% title spiro compd., 2,7,2',7'-tetrakis(dimesitylboryl)-9,9'-spirobifluorene, which was used for org. **light emitting** device. The inventive compds. can be used as electron transport material, material for blocking holes and/or host material in org. **electroluminescent** and/or phosphorescent devices, as electron transport material in photocopiers, as electron acceptor or transport material in solar cells, as charge transport material in org. integrated circuits and in org. solid lasers or org. photodetectors.

IT 128055-74-3 439791-57-8
(lithiation and sequential borylation of)

RN 128055-74-3 HCA

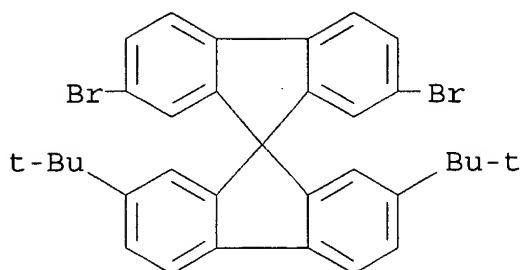
CN 9,9'-Spirobi[9H-fluorene], 2,2',7,7'-tetrabromo- (9CI) (CA INDEX NAME)



RN 439791-57-8 HCA

CN 9,9'-Spirobi[9H-fluorene], 2,7-dibromo-2',7'-bis(1,1-dimethylethyl) -

(9CI) (CA INDEX NAME)



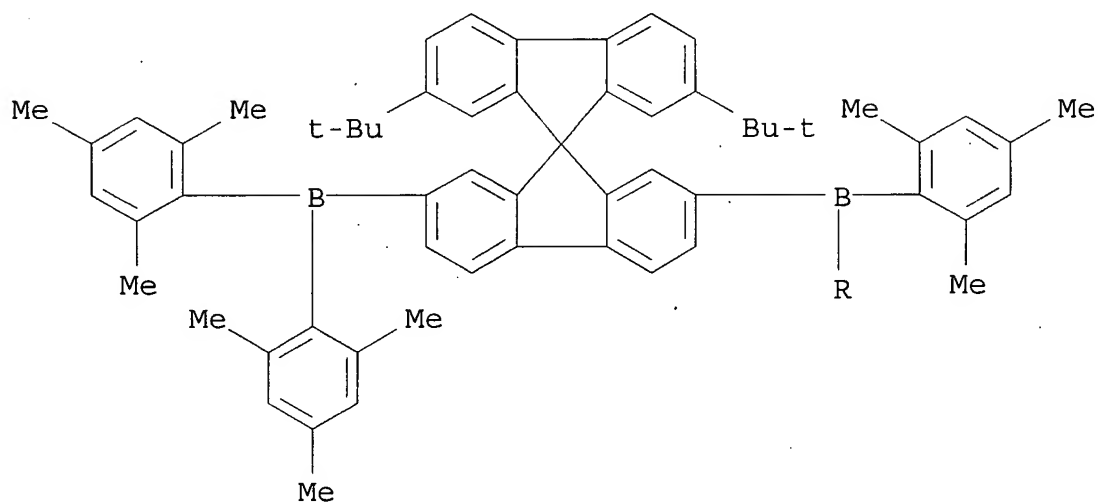
IT 439791-58-9P 439791-59-0P

(prepn. and use in electronics industry)

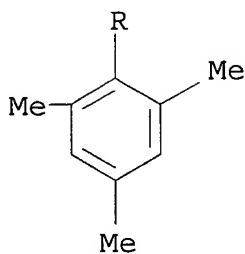
RN 439791-58-9 HCA

CN Borane, [2',7'-bis(1,1-dimethylethyl)-9,9'-spirobi[9H-fluorene]-2,7-diyl]bis[bis(2,4,6-trimethylphenyl)- (9CI) (CA INDEX NAME)]

PAGE 1-A

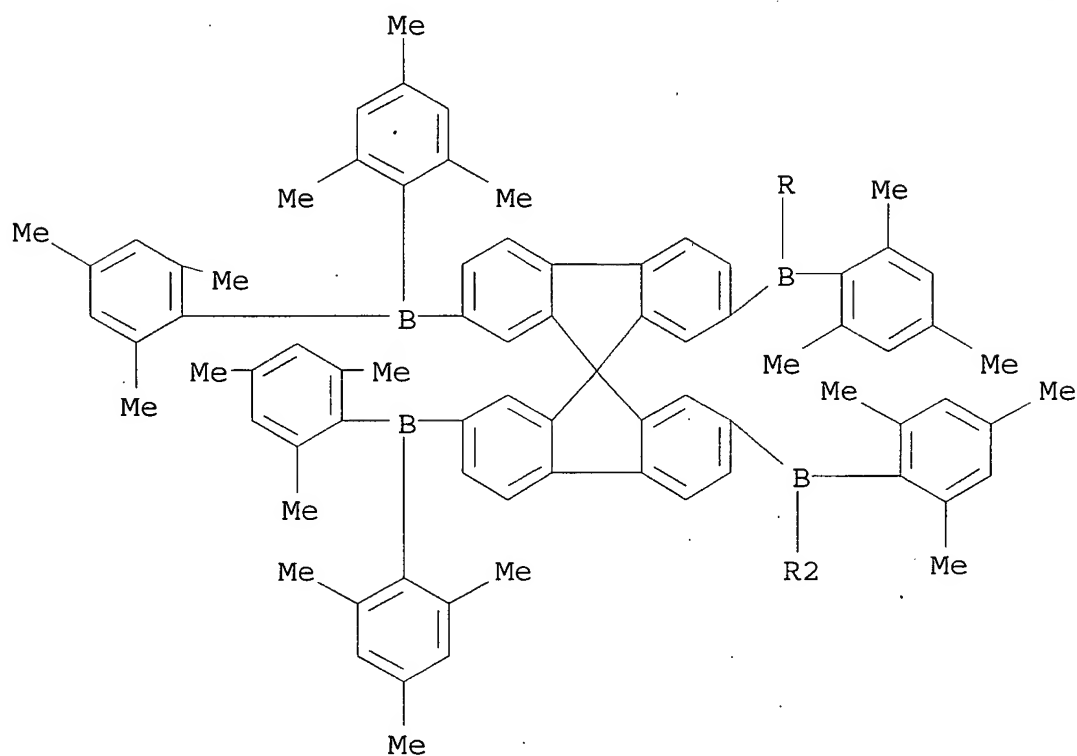


PAGE 2-A

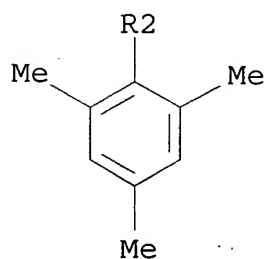
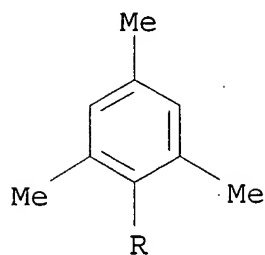


RN 439791-59-0 HCA
CN Borane, 9,9'-spirobi[9H-fluorene]-2,2',7,7'-
tetrayltetrakis[bis(2,4,6-trimethylphenyl)- (9CI) (CA INDEX NAME)

PAGE 1-A



PAGE 2-A

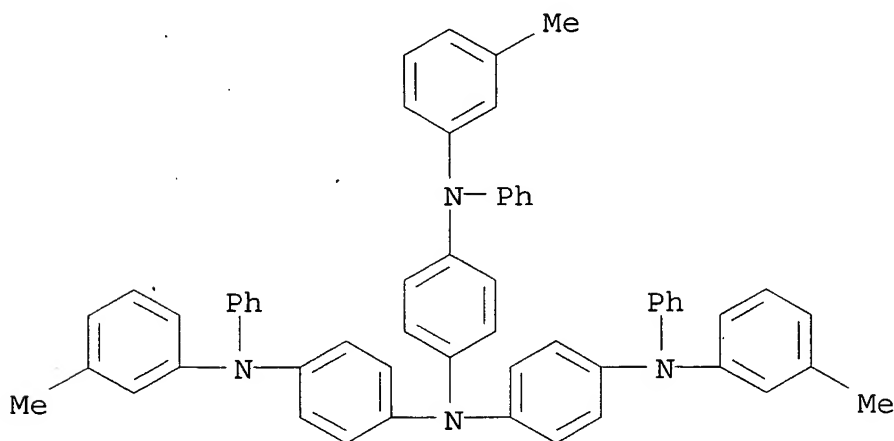


IT 124729-98-2 189363-47-1 296269-66-4

(use in electronics industry)

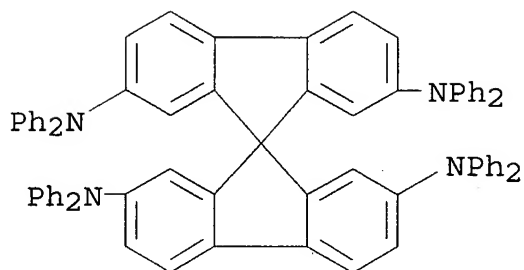
RN 124729-98-2 HCA

CN 1,4-Benzenediamine, N-(3-methylphenyl)-N',N'-bis[4-[(3-methylphenyl)phenylamino]phenyl]-N-phenyl- (9CI) (CA INDEX NAME)



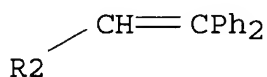
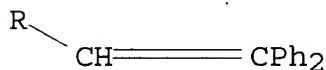
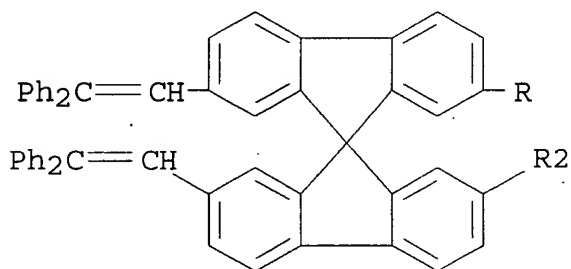
RN 189363-47-1 HCA

CN 9,9'-Spirobi[9H-fluorene]-2,2',7,7'-tetramine,
N,N,N',N',N'',N'',N''',N''',N''''-octaphenyl- (9CI) (CA INDEX NAME)



RN 296269-66-4 HCA

CN 9,9'-Spirobi[9H-fluorene], 2,2',7,7'-tetrakis(2,2-diphenylethenyl)-
(9CI) (CA INDEX NAME)



IC ICM C07F005-06
ICS C07F005-02; C09K011-06; H05B033-14; H01L051-20; C08G061-00
CC 29-5 (Organometallic and Organometalloidal Compounds)
Section cross-reference(s): 76
IT 128055-74-3 439791-57-8
(lithiation and sequential borylation of)
IT 439791-58-9P 439791-59-0P
(prepn. and use in electronics industry)
IT 124729-98-2 189363-47-1 296269-66-4
(use in electronics industry)

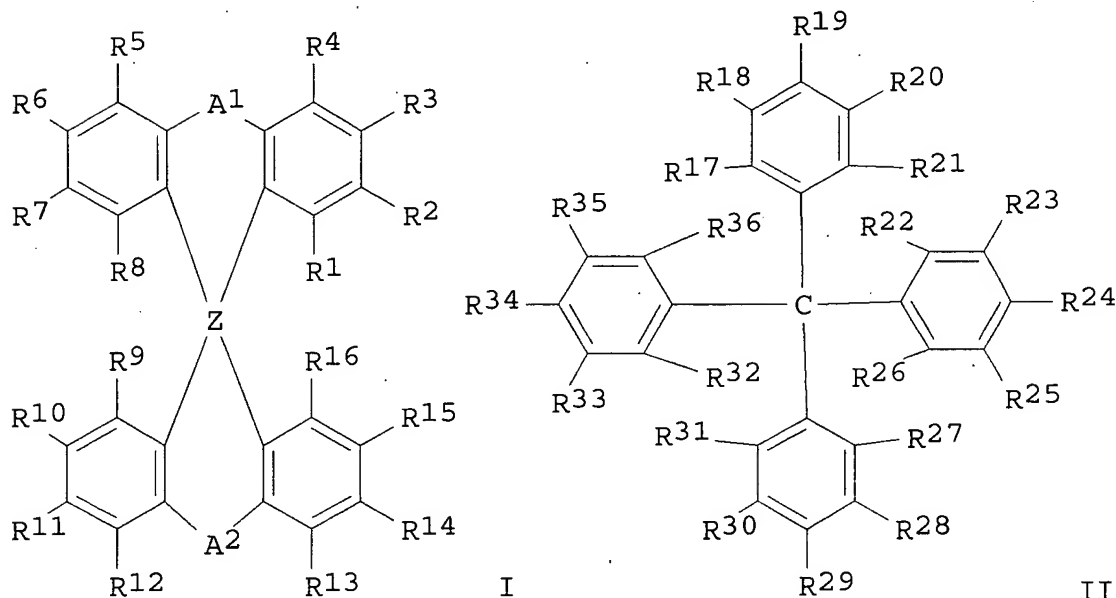
L27 ANSWER 3 OF 23 HCA COPYRIGHT 2003 ACS

136:393083 **Electroluminescent** material and component.

Tominaga, Tsuyoshi; Kitazawa, Daisuke; Makiyama, Aki; Kohama, Akira
(Toray Industries, Inc., Japan). PCT Int. Appl. WO 2002043449 A1

20020530, 77 pp. DESIGNATED STATES: W: CN, KR, US; RW: AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR. (Japanese). CODEN: PIXXD2. APPLICATION: WO 2001-JP10214 20011122. PRIORITY: JP 2000-357129 20001124; JP 2001-173610 20010608.

GI



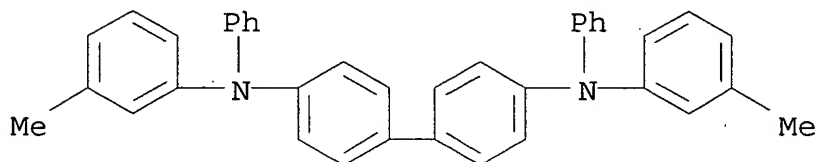
AB The invention refers to an **electroluminescent** material comprising at least one of the following: a compd. with 1,7-phenanthroline skeletons, a benzoquinoline deriv., a spiro-compd. I and a tetraphenylmethane deriv. II [A1,2 = single bond, (un)substituted alkyl, ether thioether ketone amino chain, A1 .noteq. A2; Z = C or Si; R1-16 = H, alkyl, cycloalkyl, aralkyl, alkenyl, cycloalkenyl, alkynyl, hydroxyl, mercapto, alkoxy, alkylthio, arylether, aryl thioether, aryl, heterocyclic, halo, haloalkane, haloalkene, haloalkyne, cyano, aldehyde, carbonyl, carboxyl, ester, carbamoyl, amino, nitro, silyl or siloxanyl, and adjacent groups may join together to form rings; R17-36 = H, alkyl, cycloalkyl, aralkyl, alkenyl, cycloalkenyl alkynyl, hydroxyl, mercapto, alkoxy, alkylthio, aryl ether, aryl thioether, aryl, heterocyclic, halo, haloalkane, haloalkene, haloalkyne, cyano, aldehyde, carbonyl, carboxyl, ester, carbamoyl, amino, nitro, silyl or siloxanyl, and adjacent groups may join together to form rings, wherein at least one of R17-36 is -XAr; X = single bond, -(CH₂)_n-, O, S, -(Ph)_n- or trivalent phosphor oxide; Ar = condensed arom. or heterocyclic, and when X = trivalent phosphor oxide, Ar = arom. hydrocarbon or heterocyclic].

IT 65181-78-4 123847-85-8, .alpha.-NPD

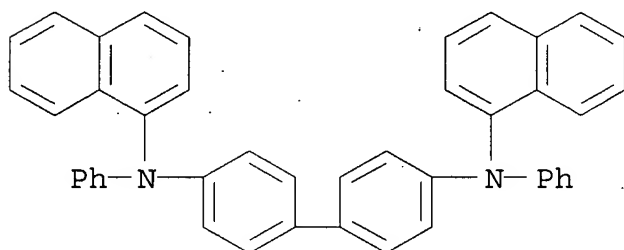
252878-73-2

(luminescent material and component)

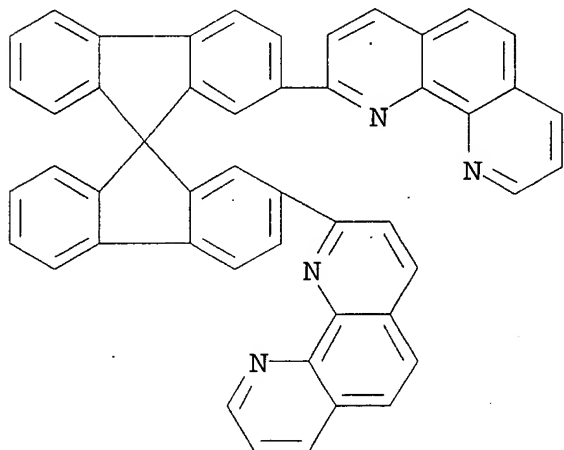
RN 65181-78-4 HCA

CN [1,1'-Biphenyl]-4,4'-diamine, N,N'-bis(3-methylphenyl)-N,N'-diphenyl-
(9CI) (CA INDEX NAME)

RN 123847-85-8 HCA

CN [1,1'-Biphenyl]-4,4'-diamine, N,N'-di-1-naphthalenyl-N,N'-diphenyl-
(9CI) (CA INDEX NAME)

RN 252878-73-2 HCA

CN 1,10-Phenanthroline, 2,2'-(9,9'-spirobi[9H-fluorene]-2,2'-diyl)bis-
(9CI) (CA INDEX NAME)

IT 427373-81-7P 427374-17-2P 427375-02-8P

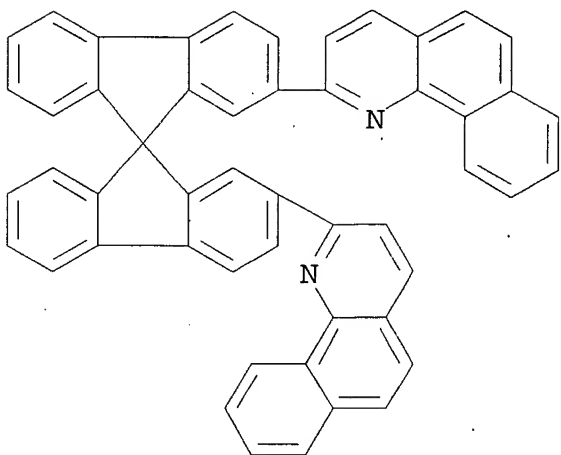
427375-47-1P

(luminescent material and component)

RN 427373-81-7 HCA

CN Benzo[h]quinoline, 2,2'-(9,9'-spirobi[9H-fluorene]-2,2'-diyl)bis-

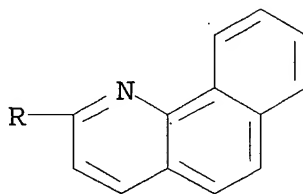
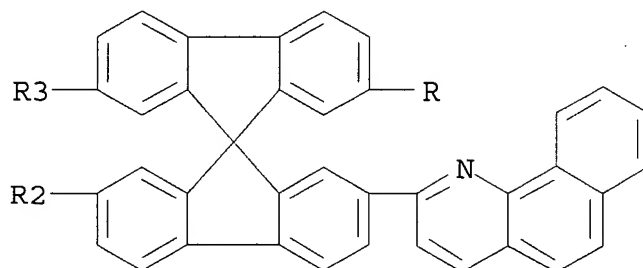
(9CI) (CA INDEX NAME)



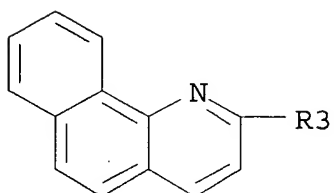
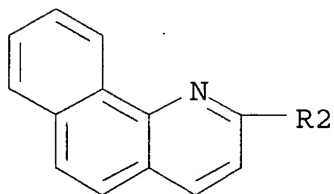
RN 427374-17-2 HCA

CN Benzo[h]quinoline, 2,2',2'',2'''-(9,9'-spirobi[9H-fluorene]-2,2',7,7'-tetrayl)tetrakis- (9CI) (CA INDEX NAME)

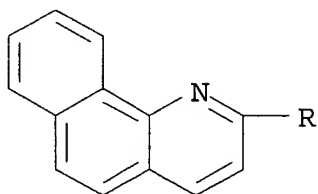
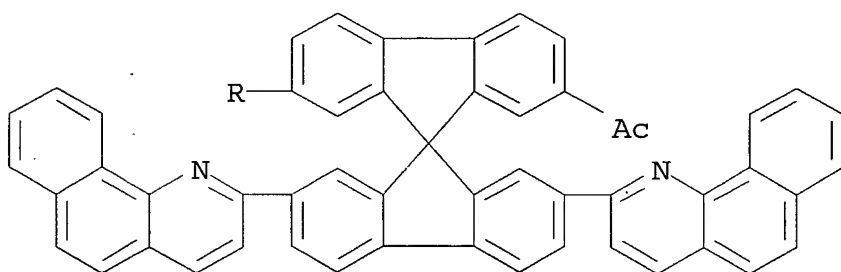
PAGE 1-A



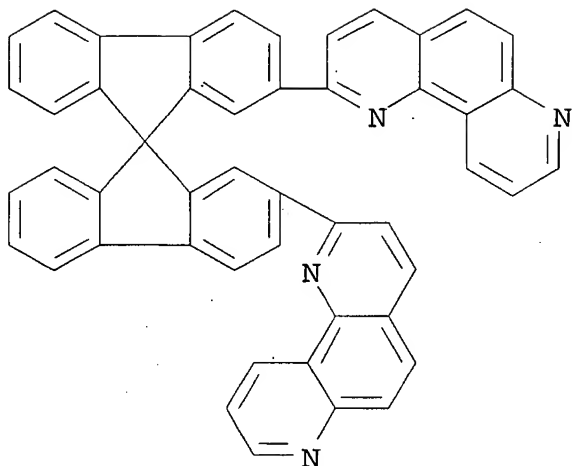
PAGE 2-A



RN 427375-02-8 HCA
CN Ethanone, 1-[2',7,7'-tris(benzo[h]quinolin-2-yl)-9,9'-spirobi[9H-fluorene]-2-yl]- (9CI) (CA INDEX NAME)



RN 427375-47-1 HCA
CN 1,7-Phenanthroline, 2,2'-(9,9'-spirobi[9H-fluorene]-2,2'-diyl)bis- (9CI) (CA INDEX NAME)

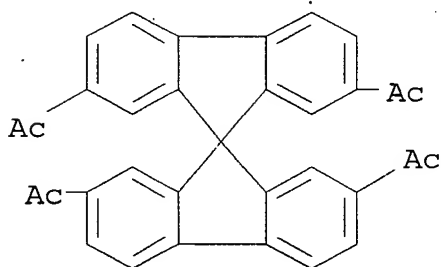


IT 73100-44-4

(luminescent material and component)

RN 73100-44-4 HCA

CN Ethanone, 1,1',1'',1'''-(9,9'-spirobi[9H-fluorene]-2,2',7,7'-tetrayl)tetrakis- (9CI) (CA INDEX NAME)

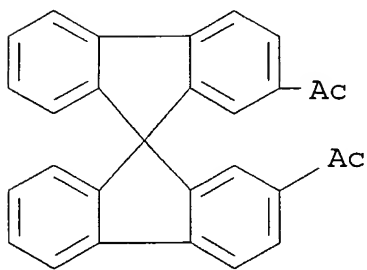


IT 22824-83-5P, 2,2'-Diacetyl-9,9'-spirobifluorene

(luminescent material and component)

RN 22824-83-5 HCA

CN Ethanone, 1,1'-(9,9'-spirobi[9H-fluorene]-2,2'-diyl)bis- (9CI) (CA INDEX NAME)

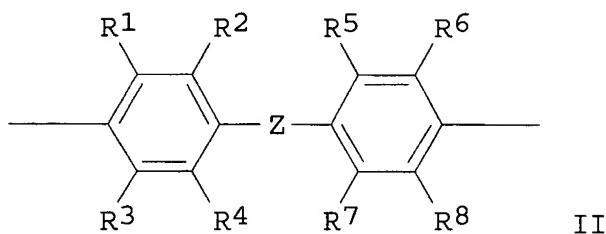
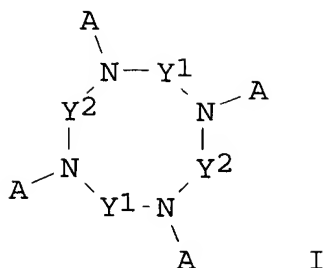


IC ICM H05B033-22
ICS H05B033-14; C09K011-06; C07D311-96; C07D471-04; C07D405-14;
C07D409-14; C07D413-14; C07D417-14; C07D407-14; C07D335-12;
C07D235-02; C07D221-10
CC 73-11 (Optical, Electron, and Mass Spectroscopy and Other Related
Properties)
ST **electroluminescent** material phenanthroline benzoquinoline
spiro tetraphenylmethane
IT Luminescent substances
(**electroluminescent**; luminescent material and
component)
IT 91-44-1, Coumarin 1 147-14-8, Copper phthalocyanine 2085-33-8,
Aluminum tris(8-hydroxyquinolinato) 4733-39-5,
2,9-Dimethyl-4,7-diphenyl-1,10-phenanthroline 21658-70-8
38215-36-0, 3-(2-Benzothiazolyl)-7-diethylaminocoumarin 58328-31-7
65181-78-4 123847-85-8, .alpha.-NPD 142289-08-5
154793-50-7 200052-70-6, DCJT 252873-65-7 **252878-73-2**
355015-23-5 359014-75-8 361196-13-6 361196-16-9 361196-17-0
361196-19-2 361375-66-8 362623-43-6 427375-49-3 427375-50-6
427375-51-7 427375-52-8 427375-53-9 427876-42-4 427876-43-5
427876-44-6 427876-45-7 427876-46-8
(luminescent material and component)
IT **427373-81-7P 427374-17-2P 427375-02-8P**
427375-40-4P 427375-42-6P **427375-47-1P** 427375-48-2P
(luminescent material and component)
IT 75-36-5, Acetyl chloride 90-47-1, 9-Xanthone 486-25-9,
-Fluorenone 630-76-2, Tetraphenyl methane 2052-07-5,
2-Bromobiphenyl 7521-41-7 13029-09-9, 2,2'-Dibromobiphenyl
14221-01-3, Tetrakis(triphenylphosphine) palladium
73100-44-4 82799-44-8 149104-90-5 158753-17-4
176853-41-1 192192-36-2 204841-19-0 427375-46-0
(luminescent material and component)
IT **22824-83-5P**, 2,2'-Diacetyl-9,9'-spirobifluorene
67665-44-5P, 9-(2-Biphenyl)-9-fluorenol 102892-77-3P
427218-32-4P 427375-39-1P 427375-41-5P 427375-43-7P
(luminescent material and component)

L27 ANSWER 4 OF 23 HCA COPYRIGHT 2003 ACS

136:377223 Cyclic tertiary amines and organic **electroluminescent**
devices employing the amines as a hole-transporting material, a
hole-injecting material or a **light-emitting**
material. Wang, Guofang; Uchida, Manabu; Yokoi, Hajime; Nakano,
Takaharu; Furukawa, Kenji (Japan). U.S. Pat. Appl. Publ. US
20020058155 A1 20020516, 12 pp. (English). CODEN: USXXCO.
APPLICATION: US 2001-965589 20010926. PRIORITY: JP 2000-297209
20000928; JP 2001-193511 20010626.

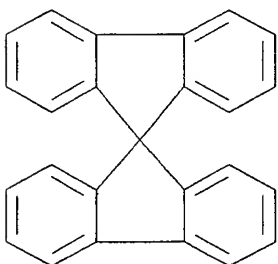
GI



AB Cyclic tertiary amine compds. are described by the formula I, where A = an alkyl group with 1-6 C atoms, a substituted or unsubstituted aryl group, a substituted or unsubstituted aralkyl group, or a substituted or unsubstituted heterocyclic group, and the 4 A substituents may be the same or partly different; Y1 = a substituted or unsubstituted arylene group, or a substituted or unsubstituted heterocyclic divalent group; Y2 = group with formula II, a substituted or unsubstituted condensed ring arylene group, or a substituted or unsubstituted heterocyclic divalent group, where R1-8 independently represents H, a halogen atom, an alkyl or alkoxy group having 1-6 C atoms, an aryl group or a heterocyclic group; and Z represents single bond, an arylene group, -CH₂-, -CH=CH-, -C.ident.C-, -C(CH₃)₂-, -CO-, -O-, -S- or -SO₂-. Org. **electroluminescent** devices employing the cyclic tertiary amines as a hole transport material, a hole injection material or a **light-emitting** material are also described and show a high luminous efficiency and a long service life.

IT 159-66-0, 9,9'-Spirobi[9H-fluorene]
(electron-transporting layer; cyclic tertiary amines and org. **electroluminescent** devices employing amines as hole-transporting material, hole-injecting material or **light-emitting** material)

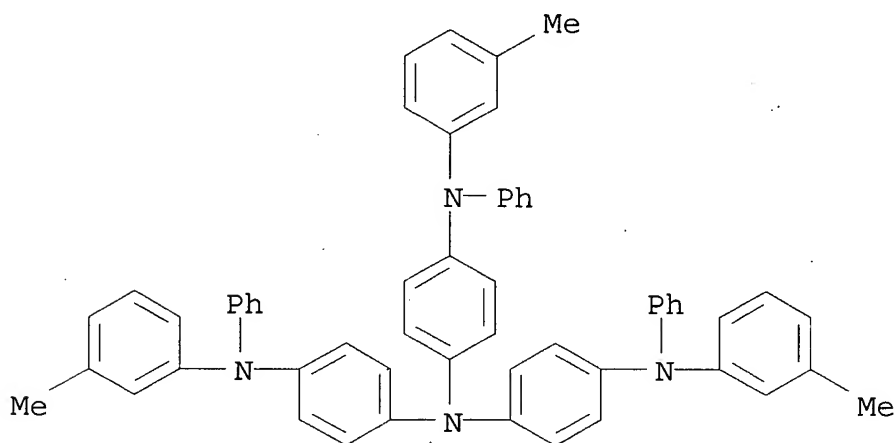
RN 159-66-0 HCA
CN 9,9'-Spirobi[9H-fluorene] (9CI) (CA INDEX NAME)



IT 124729-98-2, 4,4',4'''-Tris[N-(3-methylphenyl)-N-phenylamino]triphenylamine
(hole-injection layer; cyclic tertiary amines and org.

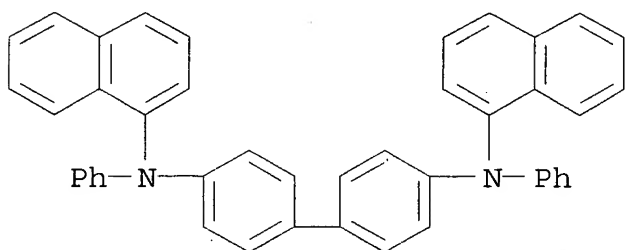
electroluminescent devices employing amines as hole-transporting material, hole-injecting material or **light-emitting** material)

RN 124729-98-2 HCA
 CN 1,4-Benzenediamine, N-(3-methylphenyl)-N',N'-bis[4-[(3-methylphenyl)phenylamino]phenyl]-N-phenyl- (9CI) (CA INDEX NAME)



IT 123847-85-8, NPD
 (hole-transporting layer; cyclic tertiary amines and org. **electroluminescent** devices employing amines as hole-transporting material, hole-injecting material or **light-emitting** material)

RN 123847-85-8 HCA
 CN [1,1'-Biphenyl]-4,4'-diamine, N,N'-di-1-naphthalenyl-N,N'-diphenyl- (9CI) (CA INDEX NAME)



IC ICM H05B033-12
 ICS C07C211-00
 NCL 428690000
 CC 73-11 (Optical, Electron, and Mass Spectroscopy and Other Related Properties)
 Section cross-reference(s): 28, 76
 ST cyclic tertiary amine org **electroluminescent** device; **electroluminescent** material cyclic tertiary amine; hole transport material cyclic tertiary amine
 IT **Electroluminescent** devices

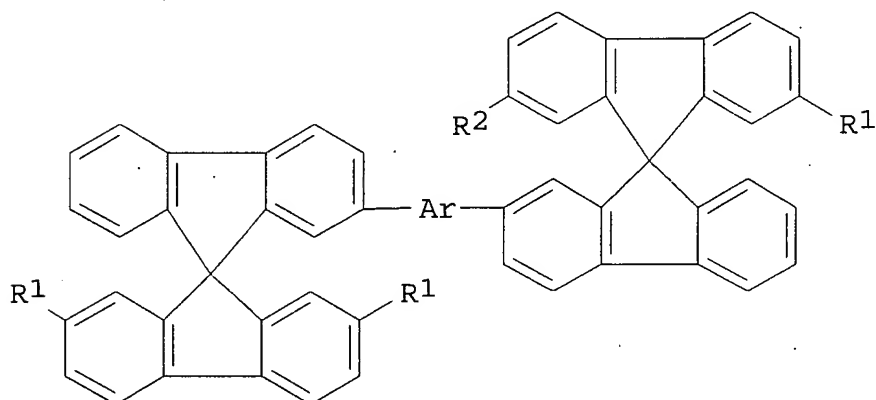
- (cyclic tertiary amines and org. **electroluminescent** devices employing amines as hole-transporting material, hole-injecting material or **light-emitting** material)
- IT Amines, uses
(cyclic, tertiary; cyclic tertiary amines and org. **electroluminescent** devices employing amines as hole-transporting material, hole-injecting material or **light-emitting** material)
- IT Luminescent substances
(**electroluminescent**; cyclic tertiary amines and org. **electroluminescent** devices employing amines as hole-transporting material, hole-injecting material or **light-emitting** material)
- IT Electric conductors
(hole-transporting and hole-injecting material; cyclic tertiary amines and org. **electroluminescent** devices employing amines as hole-transporting material, hole-injecting material or **light-emitting** material)
- IT Amines, uses
(tertiary, cyclic; cyclic tertiary amines and org. **electroluminescent** devices employing amines as hole-transporting material, hole-injecting material or **light-emitting** material)
- IT 425369-05-7P
(cyclic tertiary amines and org. **electroluminescent** devices employing amines as hole-transporting material, hole-injecting material or **light-emitting** material)
- IT 2085-33-8, Tris(8-hydroxyquinoline)aluminum 7429-90-5, Aluminum, uses 7789-24-4, Lithium fluoride, uses 50926-11-9, Indium tin oxide
(cyclic tertiary amines and org. **electroluminescent** devices employing amines as hole-transporting material, hole-injecting material or **light-emitting** material)
- IT 159-66-0, 9,9'-Spirobi[9H-fluorene]
(electron-transporting layer; cyclic tertiary amines and org. **electroluminescent** devices employing amines as hole-transporting material, hole-injecting material or **light-emitting** material)
- IT 124729-98-2, 4,4',4''-Tris[N-(3-methylphenyl)-N-phenylamino]triphenylamine
(hole-injection layer; cyclic tertiary amines and org. **electroluminescent** devices employing amines as hole-transporting material, hole-injecting material or **light-emitting** material)
- IT 123847-85-8, NPD
(hole-transporting layer; cyclic tertiary amines and org. **electroluminescent** devices employing amines as hole-transporting material, hole-injecting material or **light-emitting** material)

L27 ANSWER 5 OF 23 HCA COPYRIGHT 2003 ACS

136:332517 Blue phosphors for organic **electroluminescent**

devices. Kim, Sung Han; Yoo, Han Sung; Kwon, Soon Ki; Kim, Yun Hi; Sin, Dong Dhul; Lee, Hyun Uk; Chung, Hyung Chul (Samsung Sdi Co., Ltd., S. Korea). Jpn. Kokai Tokkyo Koho JP 2002121547 A2 20020426, 9 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 2001-154369 20010523. PRIORITY: KR 2000-60968 20001017.

GI



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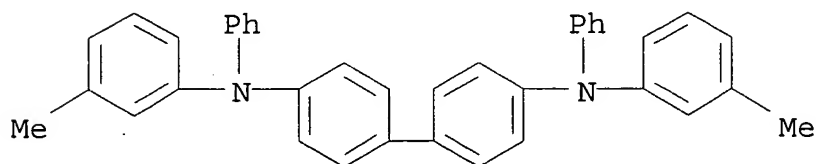
AB The phosphors comprise a spirobifluorene deriv. I (Ar = C6-20 aryl, C6-20 aryl having C1-20 alkyl, C6-20 aryl having C1-20 alkoxy; R1,2 = H, C1-20 alkyl, C6-20 aryl having C1-20 alkyl; C6-20 aryl having C1-20 alkoxy).

IT 65181-78-4, TPD 123847-85-8, .alpha.-NPD
393841-79-7

(blue phosphors for org. **electroluminescent** devices)

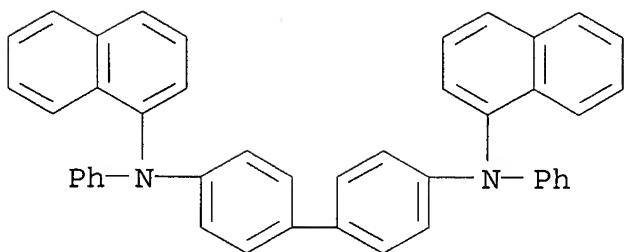
RN 65181-78-4 HCA

CN [1,1'-Biphenyl]-4,4'-diamine, N,N'-bis(3-methylphenyl)-N,N'-diphenyl-
(9CI) (CA INDEX NAME)



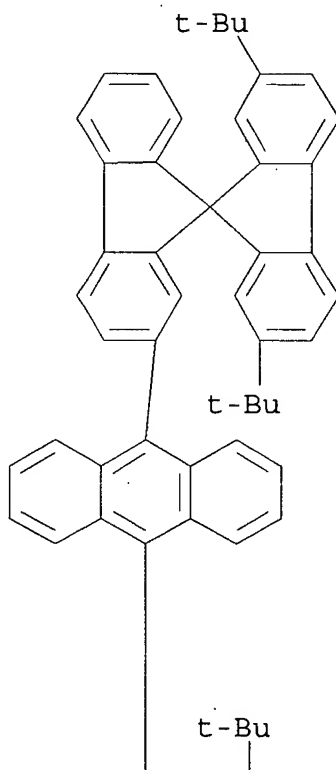
RN 123847-85-8 HCA

CN [1,1'-Biphenyl]-4,4'-diamine, N,N'-di-1-naphthalenyl-N,N'-diphenyl-
(9CI) (CA INDEX NAME)

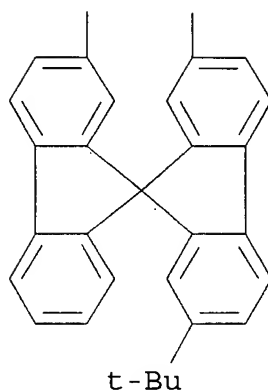


RN 393841-79-7 HCA
CN 9,9'-Spirobi[9H-fluorene], 2,2'-(9,10-anthracenediyl)bis[2',7'-bis(1,1-dimethylethyl)- (9CI) (CA INDEX NAME)

PAGE 1-A



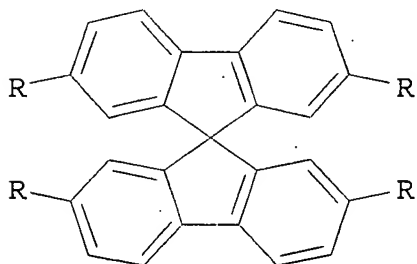
PAGE 2-A



IC ICM C09K011-06
ICS C09K011-06; H05B033-14
CC 73-5 (Optical, Electron, and Mass Spectroscopy and Other Related Properties)
ST blue phosphors org **electroluminescent** spirobifluorene deriv
IT **Electroluminescent** devices
Phosphors
(blue phosphors for org. **electroluminescent** devices)
IT 147-14-8, Copper phthalocyanine 12798-95-7 50926-11-9, ITO
65181-78-4, TPD 123847-85-8, .alpha.-NPD
393841-79-7 413627-08-4
(blue phosphors for org. **electroluminescent** devices)

L27 ANSWER 6 OF 23 HCA COPYRIGHT 2003 ACS
136:254348 Luminescent device. Nishi, Takeshi; Seo, Satoshi; Minakami, Mayumi (Semiconductor Energy Laboratory Co., Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 2002075645 A2 20020315, 17 pp. (Japanese).
CODEN: JKXXAF. APPLICATION: JP 2000-258356 20000829.

GI



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AB The invention refers to an **electroluminescent** device comprising a **org. luminescent** material which

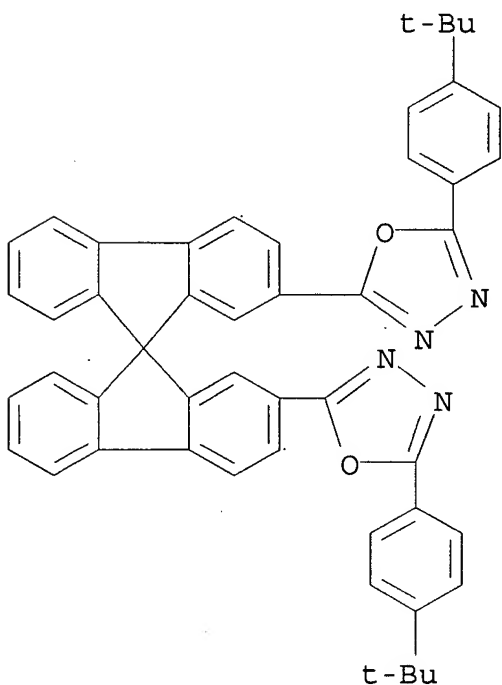
converts triplet excitation energy into luminescence, and a spiro compds. I (R = 9-azafluorene, phenylnaphthylamine, and 4-phenyl-5-(4-tert-butylphenyl)-1,2,4-triazole) as a host material for a bright low-energy display device.

IT 171408-95-0 214078-86-1 404001-42-9
404001-43-0

(luminescent device)

RN 171408-95-0 HCA

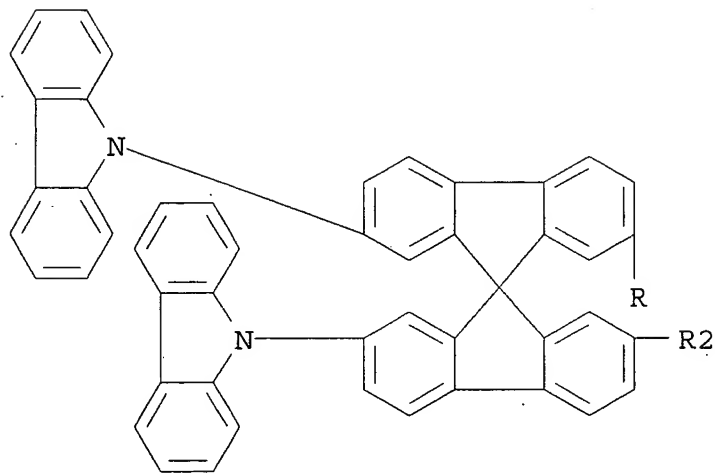
CN 1,3,4-Oxadiazole, 2,2'-(9,9'-spirobi[9H-fluorene]-2,2'-diyl)bis[5-[4-(1,1-dimethylethyl)phenyl]- (9CI) (CA INDEX NAME)



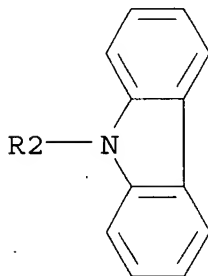
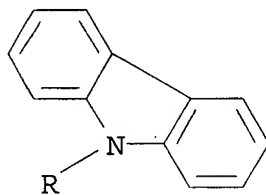
RN 214078-86-1 HCA

CN 9H-Carbazole, 9,9',9'',9'''-(9,9'-spirobi[9H-fluorene]-2,2',7,7'-tetrayl)tetrakis- (9CI) (CA INDEX NAME)

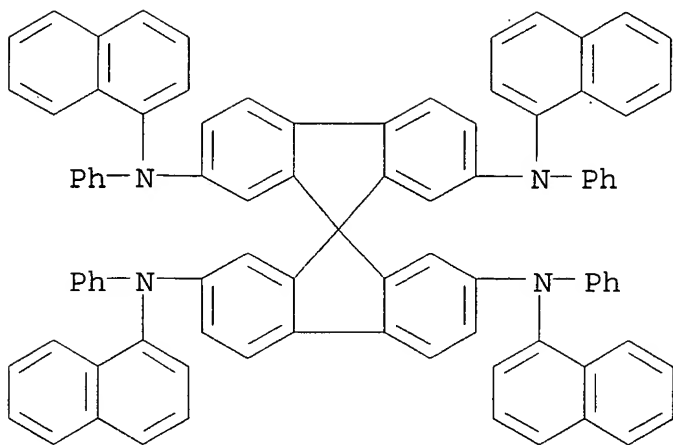
PAGE 1-A



PAGE 2-A

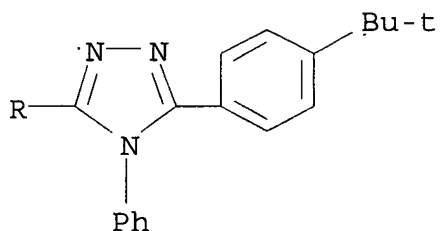
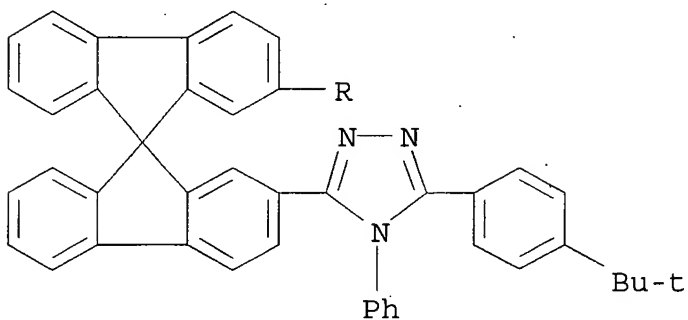


RN 404001-42-9 HCA
 CN 9,9'-Spirobi[9H-fluorene]-2,2',7,7'-tetramine, N,N',N'',N'''-tetra-1-naphthalenyl-N,N',N'',N'''-tetraphenyl- (9CI) (CA INDEX NAME).



RN 404001-43-0 HCA

CN 4H-1,2,4-Triazole, 3,3'-(9,9'-spirobi[9H-fluorene]-2,2'-diyl)bis[5-[4-(1,1-dimethylethyl)phenyl]-4-phenyl- (9CI) (CA INDEX NAME)



IC ICM H05B033-14

ICS C09K011-06; H05B033-22

CC 73-11 (Optical, Electron, and Mass Spectroscopy and Other Related Properties)

ST **electroluminescent** display device spiro compdIT **Electroluminescent** devicesOptical imaging devices
(luminescent device)

IT 171408-95-0 214078-86-1 404001-42-9

404001-43-0

(luminescent device)

L27 ANSWER 7 OF 23 HCA . COPYRIGHT 2003 ACS

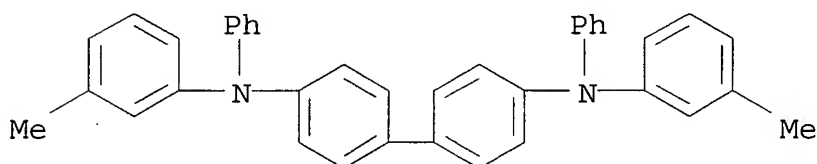
136:77069 **Electroluminescent** devices with high luminance and high color purity. Kohama, Toru; Kitazawa, Daisuke; Nishiyama, Takuya (Toray Industries, Inc., Japan). Jpn. Kokai Tokkyo Koho JP 2002008866 A2 20020111, 9 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 2001-117824 20010417. PRIORITY: JP 2000-115393 20000417.

AB The device comprises an **electroluminescent** substance ABn (A = spirobifluorene skeleton; B = fluorescent skeleton; n = natural no. of 1-4) sandwiched in between an anode and a cathode. Preferable **electroluminescent** substance is given in a Markush structure. The device may esp. be a matrix- and/or segment-type display device. The devices are also suitable as back lights, lamps, interior decorations, in electrophotog. app., etc.

IT 65181-78-4, TPD 334001-92-2
(**electroluminescent** (display) devices with high color purity and luminance)

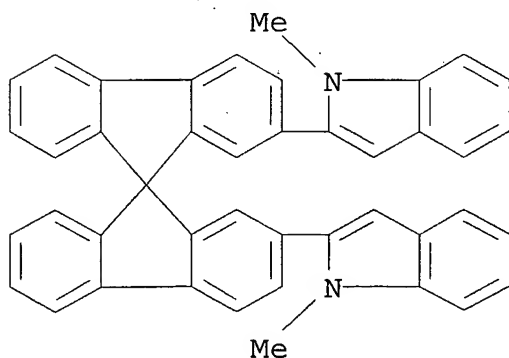
RN 65181-78-4 HCA

CN [1,1'-Biphenyl]-4,4'-diamine, N,N'-bis(3-methylphenyl)-N,N'-diphenyl-
(9CI) (CA INDEX NAME)



RN 334001-92-2 HCA

CN 1H-Indole, 2,2'-(9,9'-spirobi[9H-fluorene]-2,2'-diyl)bis[1-methyl-
(9CI) (CA INDEX NAME)



IC ICM H05B033-14

ICS C09K011-06

CC 73-11 (Optical, Electron, and Mass Spectroscopy and Other Related Properties)

Section cross-reference(s): 74

- ST **electroluminescent** device spirobilfluorene deriv high luminance; color purity high **EL** device spirobilfluorene deriv; display **EL** device high luminance
- IT **Electroluminescent** devices
(blue-emitting; **electroluminescent** (display) devices with high color purity and luminance)
- IT **Electroluminescent** devices
(**electroluminescent** (display) devices with high color purity and luminance)
- IT **Electroluminescent** devices
(green-emitting; **electroluminescent** (display) devices with high color purity and luminance)
- IT 2085-33-8, Tris(8-quinolinol)aluminum 4733-39-5,
2,9-Dimethyl-4,7-diphenyl-1,10-phenanthroline **65181-78-4**,
TPD **334001-92-2**
(**electroluminescent** (display) devices with high color purity and luminance)

L27 ANSWER 8 OF 23 HCA COPYRIGHT 2003 ACS

136:61292 Polymer matrix **electroluminescent** materials and devices. Marrocco, Matthew L., III; Motamedi, Farshad J. (Maxdem Incorporated, USA). PCT Int. Appl. WO 2001096454 A1 20011220, 60 pp. DESIGNATED STATES: W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM; RW: AT, BE, BF, BJ, CF, CG, CH, CI, CM, CY, DE, DK, ES, FI, FR, GA, GB, GR, IE, IT, LU, MC, ML, MR, NE, NL, PT, SE, SN, TD, TG, TR. (English). CODEN: PIXXD2. APPLICATION: WO 2001-US18867 20010612. PRIORITY: US 2000-PV211108 20000612.

GI

* STRUCTURE DIAGRAM TOO LARGE FOR DISPLAY - AVAILABLE VIA OFFLINE PRINT *

- AB Compns. are described which comprise a polymer comprising repeat units selected from described by the general formulas I-XII (R = independently selected H, D, F, alkoxy, aryloxy, alkyl, aryl, alkyl ketone, aryl ketone, alkylester, arylester, amide, carboxylic acid, fluoroalkyl, fluoroaryl, and polyalkylene oxy groups; R' = independently selected H, D, F, Cl, Br, I alkoxy, aryloxy, alkyl, aryl, alkyl ketone, aryl ketone, alkylester, arylester, amide, carboxylic acid, fluoroalkyl, fluoroaryl, and polyalkylene oxy groups; any two of the R or R' groups may be bridging; A and B = independently selected -O-, -S-, NR1, CR1R2, CR1R2CR3R4-, N:CR1, CR1:CR2-, -N:N-, and -(CO)-; R1-4 are H, D, F, alkyl, aryl, alkyleneoxy, polyalkyleneoxy, alkoxy, aryloxy, fluoroalkyl, and

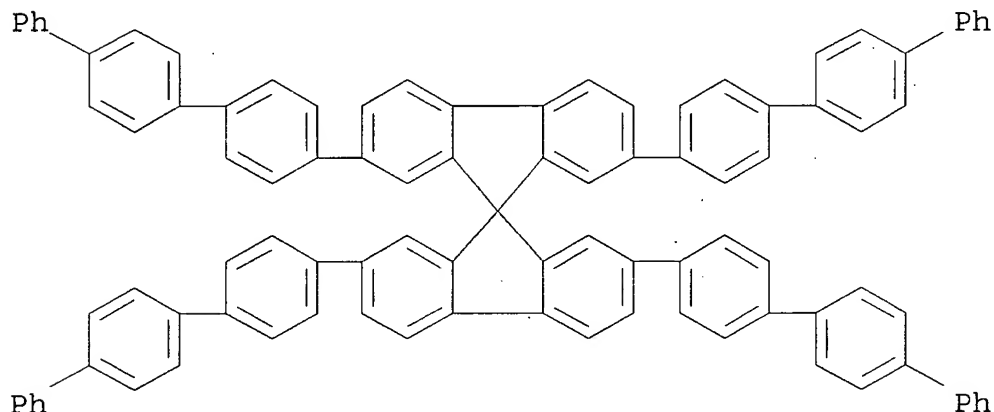
fluoroaryl; m = 0-2; n = 0-3; o = 0-4; p = 0-5; q = 0-6; r = 0-7; and E is selected from the group consisting of O, NH, and S) and .gtoreq.1 luminescent metal ions or luminescent metal ion complexes. **Electroluminescent** compns. are also described which comprise an arom. hydrocarbon matrix; and a lanthanide metal complex having an arom. ligand. **Electroluminescent** devices using the compns. are also described.

IT 187040-56-8

(polymer matrix luminescent and **electroluminescent** materials and **electroluminescent** devices using the compns.)

RN 187040-56-8 HCA

CN 9,9'-Spirobi[9H-fluorene], 2,2',7,7'-tetrakis([1,1':4',1''-terphenyl]-4-yl)- (9CI) (CA INDEX NAME)

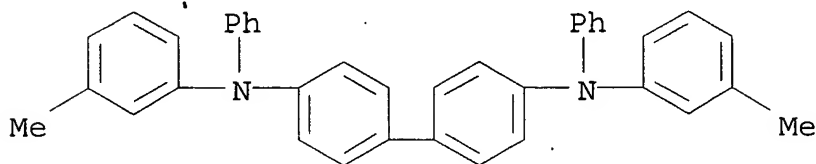


IT 65181-78-4

(polymer matrix luminescent and **electroluminescent** materials and **electroluminescent** devices using the compns.)

RN 65181-78-4 HCA

CN [1,1'-Biphenyl]-4,4'-diamine, N,N'-bis(3-methylphenyl)-N,N'-diphenyl- (9CI) (CA INDEX NAME)



IC ICM C08K003-08

ICS C08K003-10; H01J001-62; H01L033-00

CC 73-11 (Optical, Electron, and Mass Spectroscopy and Other Related Properties)

Section cross-reference(s): 38, 76

ST luminescent material polymer matrix; **electroluminescent** material polymer matrix; **electroluminescent** device polymer

- matrix material
- IT Luminescent substances
(**electroluminescent**; polymer matrix luminescent and **electroluminescent** materials and **electroluminescent** devices using the compns.)
- IT **Electroluminescent** devices
Luminescent substances
(polymer matrix luminescent and **electroluminescent** materials and **electroluminescent** devices using the compns.)
- IT 1314-36-9, Yttria, uses
(europium-doped; polymer matrix luminescent and **electroluminescent** materials and **electroluminescent** devices using the compns.)
- IT 50926-11-9, ITO 73667-23-9, Poly[oxy[(2-aminoethyl)-1,2-phenylene]] 125620-66-8 **187040-56-8**
(polymer matrix luminescent and **electroluminescent** materials and **electroluminescent** devices using the compns.)
- IT 66-71-7, 1,10-Phenanthroline 1314-98-3, Zinc sulfide, uses 7439-88-5, Iridium, uses 7439-88-5D, Iridium, compds. 7439-89-6, Iron, uses 7439-89-6D, Iron, compds. 7439-96-5, Manganese, uses 7439-96-5D, Manganese, compds. 7439-98-7, Molybdenum, uses 7439-98-7D, Molybdenum, compds. 7440-04-2, Osmium, uses 7440-04-2D, Osmium, compds. 7440-05-3, Palladium, uses 7440-05-3D, Palladium, compds. 7440-06-4, Platinum, uses 7440-06-4D, Platinum, compds. 7440-15-5, Rhenium, uses 7440-15-5D, Rhenium, compds. 7440-16-6, Rhodium, uses 7440-16-6D, Rhodium, compds. 7440-18-8, Ruthenium, uses 7440-18-8D, Ruthenium, compds. 7440-22-4, Silver, uses 7440-22-4D, Silver, compds. 7440-27-9, Terbium, uses 7440-33-7, Tungsten, uses 7440-33-7D, Tungsten, compds. 7440-45-1, Cerium, uses 7440-47-3, Chromium, uses 7440-47-3D, Chromium, compds. 7440-48-4, Cobalt, uses 7440-48-4D, Cobalt, compds. 7440-53-1, Europium, uses 7440-57-5, Gold, uses 7440-57-5D, Gold, compds. 7440-61-1, Uranium., uses 7440-61-1D, Uranium, compds. 9003-53-6, Polystyrene 10025-76-0, Europium trichloride 10042-88-3, Terbium trichloride 10043-27-3, Terbium nitrate 10108-73-3, Cerium nitrate 10138-01-9, Europium nitrate 14284-86-7, Europium tris(acetylacetonate) 14552-07-9 14654-15-0 22541-18-0, Europium +3, uses 22541-20-4, Terbium +3, uses 63356-23-0 **65181-78-4** 76634-72-5, Tris(8-hydroxyquinolinato)terbium
(polymer matrix luminescent and **electroluminescent** materials and **electroluminescent** devices using the compns.)
- IT 136065-11-7P 137832-75-8P 151755-33-8P 153847-53-1DP, 1,3-Dichlorobenzene-2,5-dichlorobenzophenone copolymer, reaction products 153847-54-2DP, 1,4-Dichlorobenzene-2,5-dichlorobenzophenone copolymer, reaction products 190712-06-2P 286438-49-1P 381210-95-3P 381210-96-4P 381210-97-5P
(polymer matrix luminescent and **electroluminescent**

materials and **electroluminescent** devices using the compns.)

IT 536-74-3, Phenylacetylene 4316-58-9

(polymer matrix luminescent and **electroluminescent** materials and **electroluminescent** devices using the compns.)

IT 13708-63-9, Terbium trifluoride 13765-25-8, Europium trifluoride (zinc sulfide doped with; polymer matrix luminescent and **electroluminescent** materials and **electroluminescent** devices using the compns.)

L27 ANSWER 9 OF 23 HCA COPYRIGHT 2003 ACS

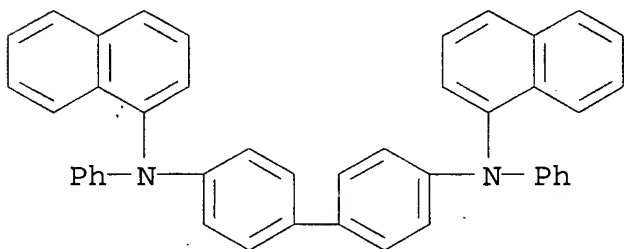
135:350356 White luminescent **light emitting** organic **electroluminescent** device. Kim, Dong Gun; Cho, Sung Woo (Samsung SDI Co., Ltd., S. Korea). Jpn. Kokai Tokkyo Koho JP 2001313180 A2 20011109, 14 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 2001-78812 20010319. PRIORITY: KR 2000-15572 20000327.

AB The invention relates to a white **luminescence**-emitting **org. electroluminescent** device comprising .gtoreq.2 **electroluminescent** layers fabricated between a hole-transport layer and an electron-transport layer, wherein the charge transport buffer layer is inserted between the **electroluminescent** layers, so that the ratio of the exciton generation in the two **electroluminescent** layers may be readily tuned by appropriately adjusting the thickness of the buffer layer.

IT 123847-85-8, NPB 124729-98-2, 4,4',4''-Tris[N-3-methylphenyl-N-phenyl-amino]triphenylamine 296269-66-4 (white **luminescent light emitting org. electroluminescent** device)

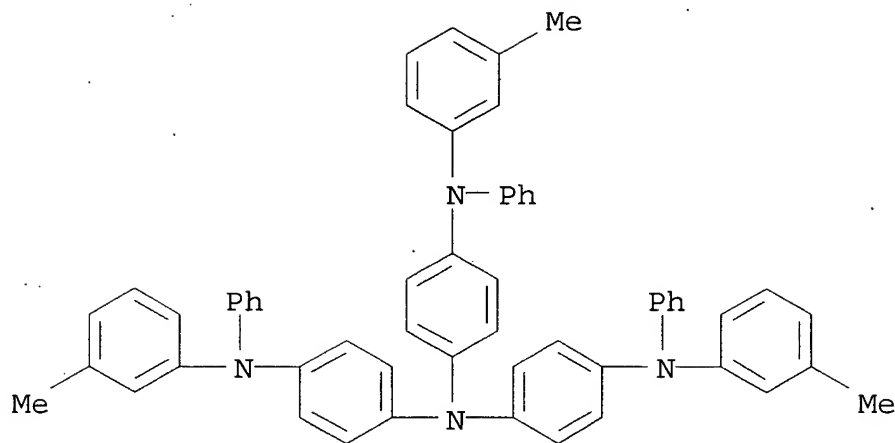
RN 123847-85-8 HCA

CN [1,1'-Biphenyl]-4,4'-diamine, N,N'-di-1-naphthalenyl-N,N'-diphenyl- (9CI) (CA INDEX NAME)



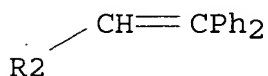
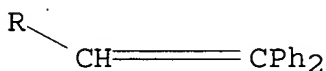
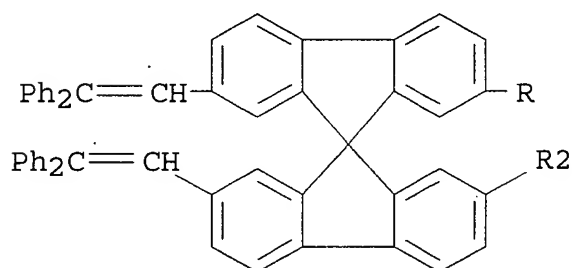
RN 124729-98-2 HCA

CN 1,4-Benzenediamine, N-(3-methylphenyl)-N',N'-bis[4-[(3-methylphenyl)phenylamino]phenyl]-N-phenyl- (9CI) (CA INDEX NAME)



RN 296269-66-4 HCA

CN 9,9'-Spiro[9H-fluorene], 2,2',7,7'-tetrakis(2,2-diphenylethenyl)-(9CI) (CA INDEX NAME)



IC H05B033-22; H05B033-22; C09K011-06; H05B033-12; H05B033-14

CC 73-11 (Optical, Electron, and Mass Spectroscopy and Other Related Properties)

ST white luminescent light emitting
org electroluminescent device

IT Electroluminescent devices
(white luminescent light emitting
org. electroluminescent device)

IT 147-14-8, Copper phthalocyanine 517-51-1, Rubrene 2085-33-8, Al
8q 7429-90-5, Aluminum, uses 7789-24-4, Lithium fluoride, uses

50926-11-9, ITO 123847-85-8, NPB 124729-98-2,
4,4',4''-Tris[N-3-methylphenyl-N-phenyl-amino]triphenylamine
200052-70-6 213527-39-0 296269-66-4
(white luminescent light emitting
org. electroluminescent device)

L27 ANSWER 10 OF 23 HCA COPYRIGHT 2003 ACS

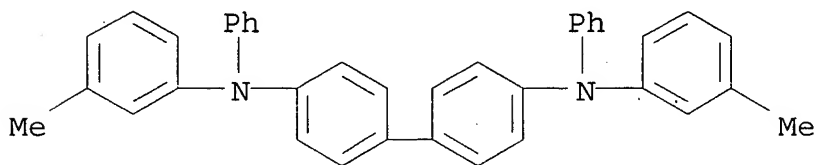
135:350270 **Light emitting** devices. Kohama, Toru;
Makiyama, Akira; Tominaga, Takeshi (Toray Industries, Inc., Japan).
Jpn. Kokai Tokkyo Koho JP 2001307879 A2 20011102, 7 pp. (Japanese).
CODEN: JKXXAF. APPLICATION: JP 2000-115391 20000417.

AB The devices comprise a phosphor emitting a peak at 400-550 nm and
comprising a spiro deriv.

IT 65181-78-4 123847-85-8, .alpha.-NPD
296269-66-4, 2,2',7,7'-Tetrakis(2,2-diphenylvinyl)spiro-9,9'-
bifluorene 371227-68-8
(light emitting devices)

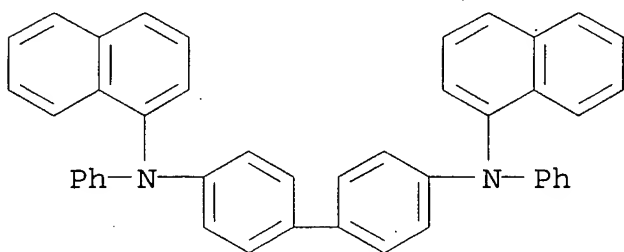
RN 65181-78-4 HCA

CN [1,1'-Biphenyl]-4,4'-diamine, N,N'-bis(3-methylphenyl)-N,N'-diphenyl-
(9CI) (CA INDEX NAME)



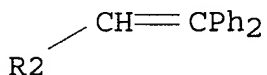
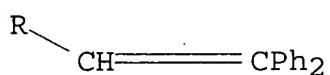
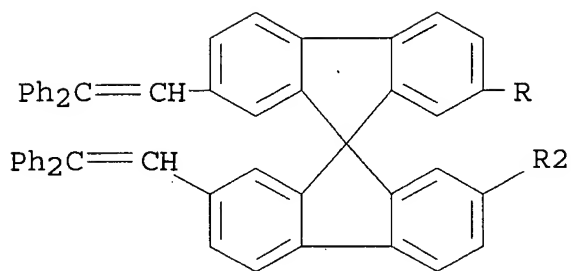
RN 123847-85-8 HCA

CN [1,1'-Biphenyl]-4,4'-diamine, N,N'-di-1-naphthalenyl-N,N'-diphenyl-
(9CI) (CA INDEX NAME)

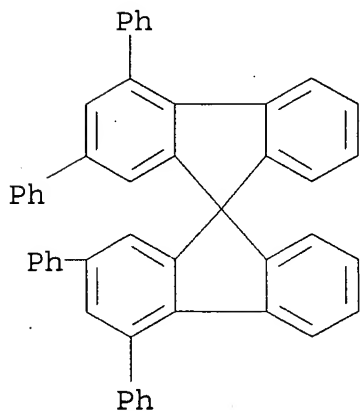


RN 296269-66-4 HCA

CN 9,9'-Spirobi[9H-fluorene], 2,2',7,7'-tetrakis(2,2-diphenylethenyl)-
(9CI) (CA INDEX NAME)



RN 371227-68-8 HCA
 CN 9,9'-Spirobi[9H-fluorene], 2,2',4,4'-tetraphenyl- (9CI) (CA INDEX NAME)



IC ICM H05B033-14
 ICS C09K011-06
 CC 73-5 (Optical, Electron, and Mass Spectroscopy and Other Related Properties)
 ST org **electroluminescent** device spiro phosphor
 IT Anodes
 Cathodes
 Fluorescence
 Luminescent substances
 (light emitting devices)
 IT 87-01-4, Coumarin 311 159-68-2, 9,9'-Spirobi[9H-9-silafluorene]

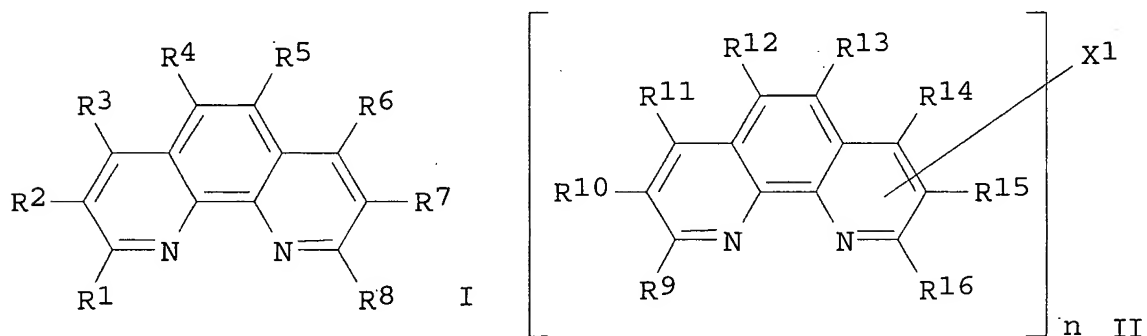
4733-39-5, 2,9-Dimethyl-4,7-diphenyl-1,10-phenanthroline
 7439-93-2, Lithium, uses. 50926-11-9, ITO. 62423-24-9
 65181-78-4 121207-31-6 123847-85-8, .alpha.-NPD
 252873-65-7 296269-66-4, 2,2',7,7'-Tetrakis(2,2-
 diphenylvinyl)spiro-9,9'-bifluorene 371227-68-8
 (light emitting devices)

IT 198-55-0, Perylene
 (light emitting devices)

L27 ANSWER 11 OF 23 HCA COPYRIGHT 2003 ACS

135:280166 Organic **electroluminescent** devices. Tominaga,
 Takeshi; Makiyama, Akira; Kohama, Toru (Toray Industries, Inc.,
 Japan). Jpn. Kokai Tokkyo Koho JP 2001267080 A2 20010928, 13 pp.
 (Japanese). CODEN: JKXXAF. APPLICATION: JP 2000-372543 20001207.
 PRIORITY: JP 2000-6933 20000114.

GI

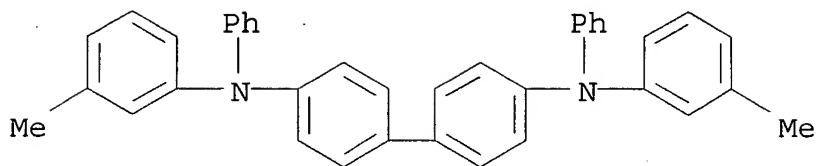


AB The devices comprise a pair of electrodes interposing a phosphor layer contg. a phenanthroline derivs. I and II (R1-16 = H, alkyl, cycloalkyl, aralkyl, alkenyl, cycloalkenyl, OH, SH, alkoxy, alkylthio, arylether, arylthioether, aryl, heterocyclic, halo, haloalkane, haloalkene, haloalkyne, CN, aldehyde, carbonyl, carboxyl, ester, carbamoyl, amino, nitro, silyl, siloxanyl; n .gtoreq. 2; and X1 = single bond, bonding between phenanthroline groups).

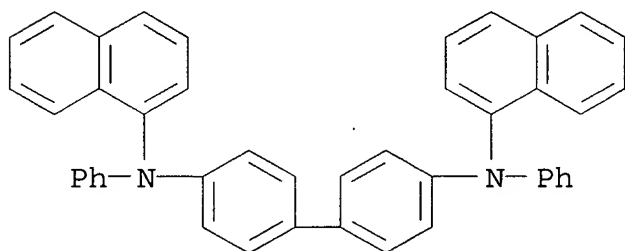
IT 65181-78-4, TPD 123847-85-8, .alpha.-NPD
 252878-73-2
 (org. **electroluminescent** devices)

RN 65181-78-4 HCA

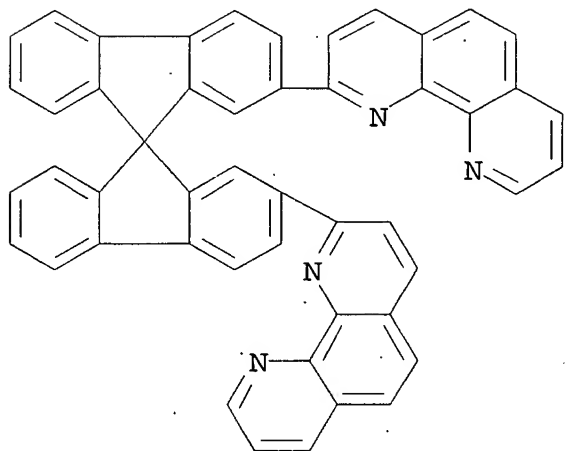
CN [1,1'-Biphenyl]-4,4'-diamine, N,N'-bis(3-methylphenyl)-N,N'-diphenyl-
 (9CI) (CA INDEX NAME)



RN 123847-85-8 HCA

CN [1,1'-Biphenyl]-4,4'-diamine, N,N'-di-1-naphthalenyl-N,N'-diphenyl-
(9CI) (CA INDEX NAME)

RN 252878-73-2 HCA

CN 1,10-Phenanthroline, 2,2'-(9,9'-spirobi[9H-fluorene]-2,2'-diyl)bis-
(9CI) (CA INDEX NAME)

IC H05B033-14; C09K011-06; G09F009-30; H05B033-22

CC 73-5 (Optical, Electron, and Mass Spectroscopy and Other Related Properties)

ST org **electroluminescent** phenanthroline deriv phosphor.
deviceIT **Electroluminescent** devices

Fluorescent substances

Luminescent substances

Phosphors

(org. **electroluminescent** devices)

IT 147-14-8, Copper phthalocyanine 2085-33-8, Tris(8-quinolinolato)aluminum 50926-11-9, ITO 65181-78-4, TPD 123847-85-8, .alpha.-NPD 176853-54-6 192226-54-3 203931-43-5 252878-73-2 338734-79-5 362617-79-6 362623-43-6

(org. **electroluminescent** devices)

IT 7439-93-2, Lithium, uses 345312-03-0
(org. **electroluminescent** devices)

L27 ANSWER 12 OF 23 HCA COPYRIGHT 2003 ACS

135:159966 Organicelectroluminescent devices employing spiro compounds. Suzuki, Koichi; Hashimoto, Yuichi; Senoo, Akihiro; Ueno, Kazunori (Canon Kabushiki Kaisha, Japan). Eur. Pat. Appl. EP 1120840 A2 20010801, 47 pp. DESIGNATED STATES: R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO. (English). CODEN: EPXXDW. APPLICATION: EP 2001-300728 20010126. PRIORITY: JP 2000-19242 20000127.

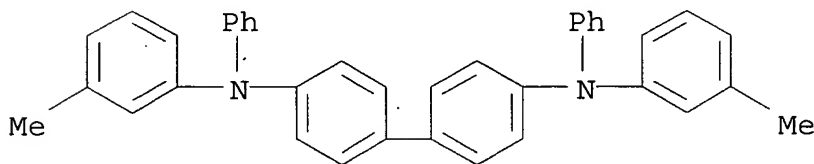
AB Org. **electroluminescent** devices are described which are provided with org. layers contg. selected spiro compds.

IT 65181-78-4 352351-93-0 352351-98-5
352352-01-3 352354-12-2 352354-25-7
352424-58-9

(org. **electroluminescent** devices employing spiro compds.)

RN 65181-78-4 HCA

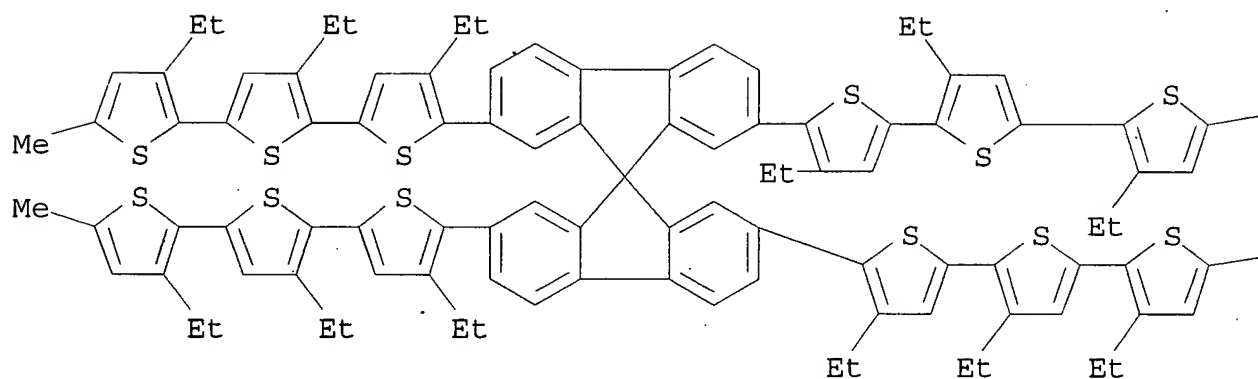
CN [1,1'-Biphenyl]-4,4'-diamine, N,N'-bis(3-methylphenyl)-N,N'-diphenyl- (9CI) (CA INDEX NAME)



RN 352351-93-0 HCA

CN 2,2':5',2''-Terthiophene, 5,5''',5''''',5''''''''-(9,9'-spirobi[9H-fluorene]-2,2',7,7'-tetrayl)tetrakis[3',3'',4-triethyl-5''-methyl- (9CI) (CA INDEX NAME)

PAGE 1-A



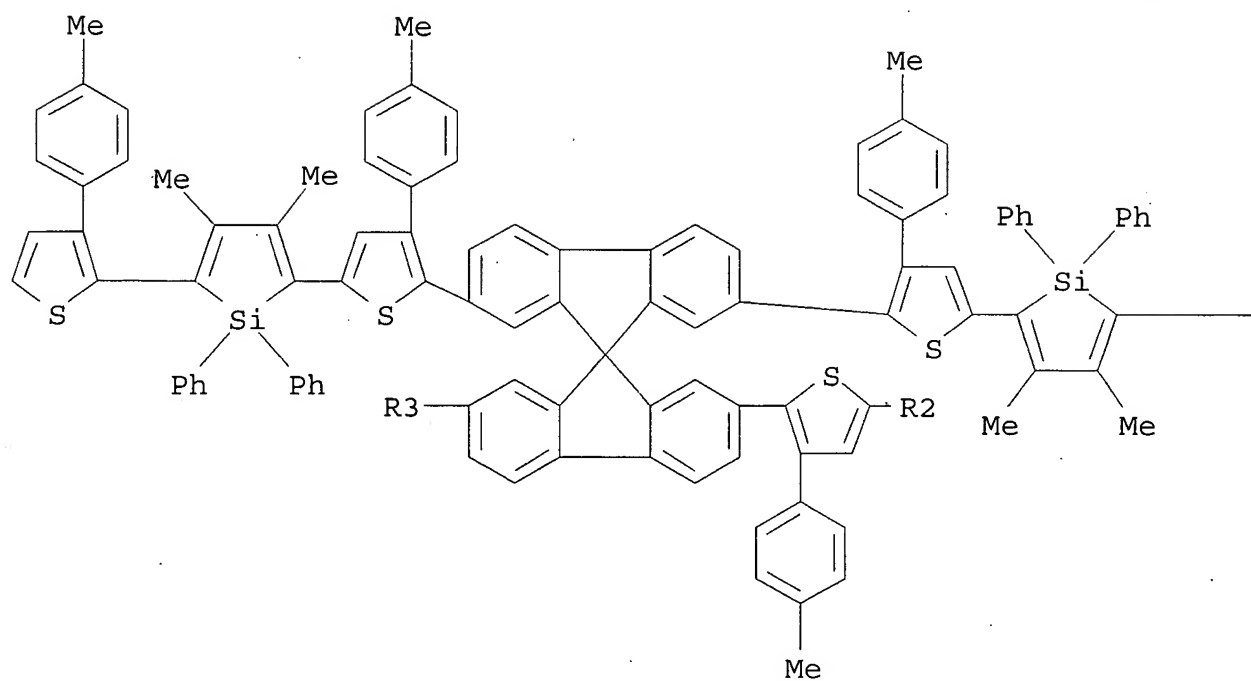
PAGE 1-B

— Me

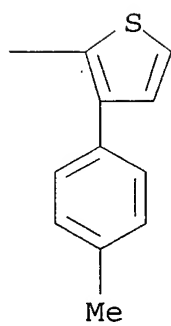
— Me

RN 352351-98-5 HCA
 CN Thiophene, 2,2',2'',2'''-(9,9'-spirobi[9H-fluorene]-2,2',7,7'-
 tetrayl)tetrakis[5-[3,4-dimethyl-5-[3-(4-methylphenyl)-2-thienyl]-
 1,1-diphenylsilacyclopenta-2,4-dien-2-yl]-3-(4-methylphenyl)- (9CI)
 (CA INDEX NAME)

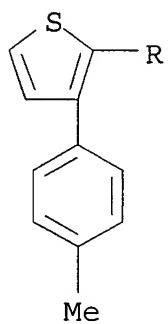
PAGE 1-A



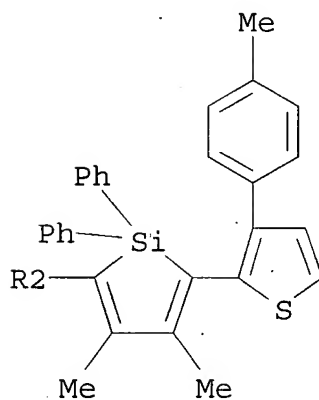
PAGE 1-B



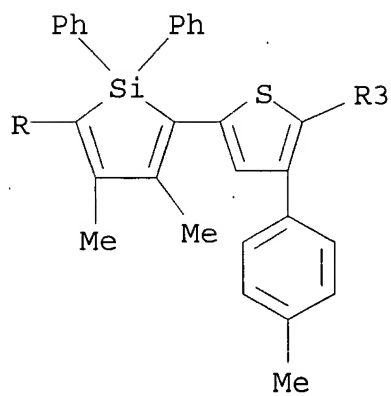
PAGE 2-A



PAGE 3-A



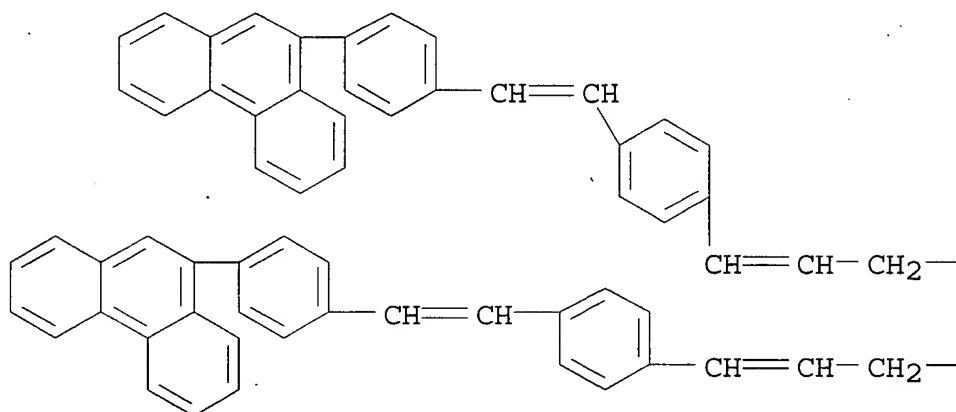
PAGE 4-A



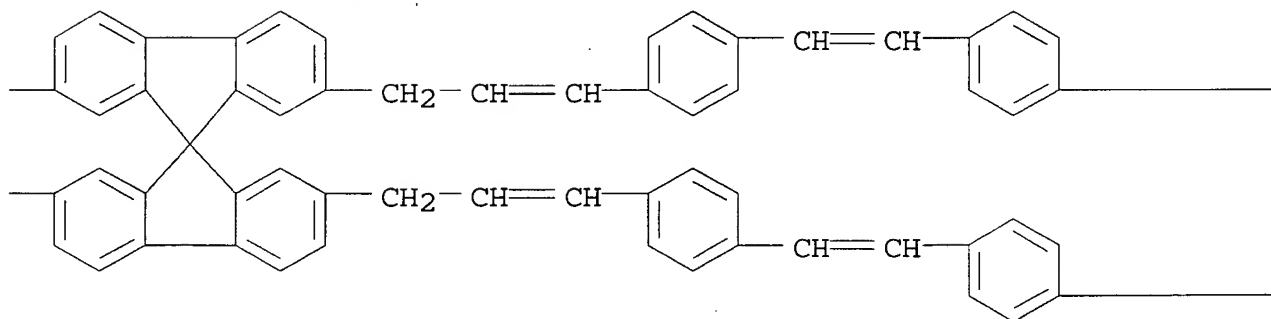
RN 352352-01-3 HCA
 CN 9,9'-Spirobi[9H-fluorene], 2,2',7,7'-tetrakis[3-[4-[2-[4-(9-

phenanthrenyl)phenyl]ethenyl]phenyl]-2-propenyl] - (9CI) (CA INDEX NAME)

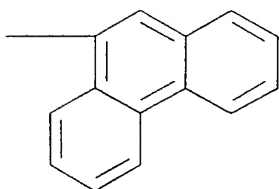
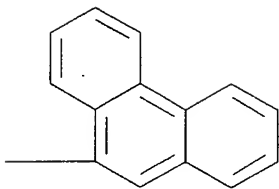
PAGE 1-A



PAGE 1-B

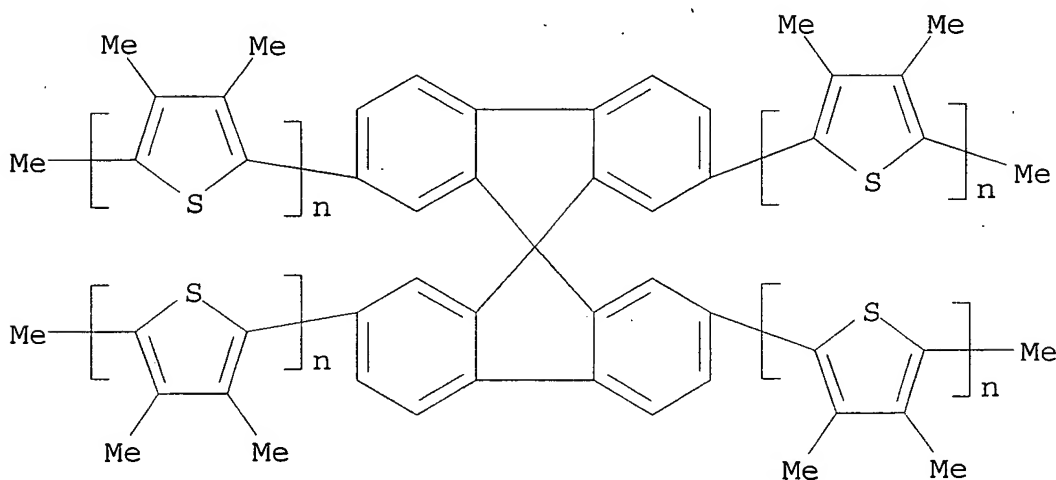


PAGE 1-C



RN 352354-12-2 HCA

CN Poly(3,4-dimethyl-2,5-thiophenediyl), .alpha.,.alpha.',.alpha.'',.alpha.'''-9,9'-spirobi[9H-fluorene]-2,2',7,7'-tetrayltetrakis[.omega.-methyl- (9CI) (CA INDEX NAME)



RN 352354-25-7 HCA

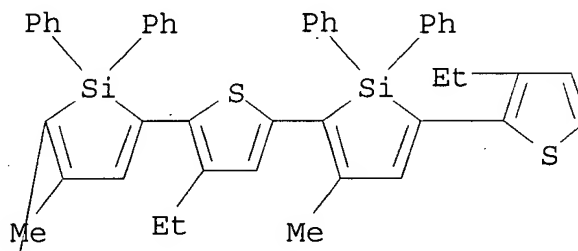
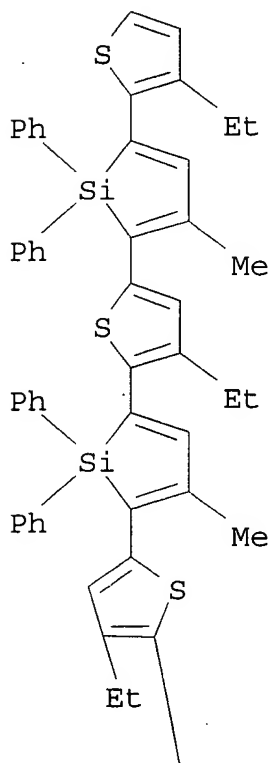
CN Poly[(4-methyl-3-octyl-2,5-thiophenediyl)-1,2-ethynediyl], .alpha.,.alpha.',.alpha.'',.alpha.'''-9,9'-spirobi[9H-fluorene]-2,2',7,7'-tetrayltetrakis[.omega.-(4-methyl-3-octyl-2-thienyl)- (9CI) (CA INDEX NAME)

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***

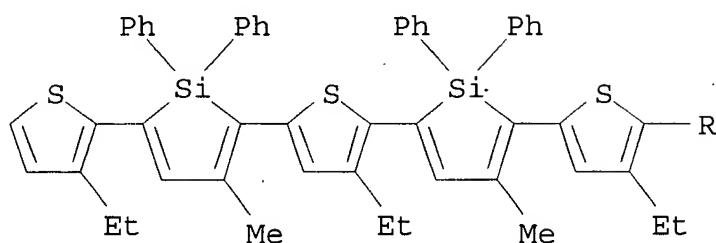
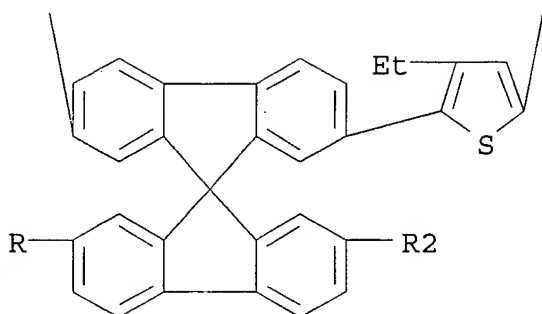
RN 352424-58-9 HCA

CN Thiophene, 2,2',2'',2'''-(9,9'-spirobi[9H-fluorene]-2,2',7,7'-
tetrayl)tetrakis[3-ethyl-5-[5-[3-ethyl-5-[5-(3-ethyl-2-thienyl)-3-
methyl-1,1-diphenylsilacyclopenta-2,4-dien-2-yl]-2-thienyl]-3-methyl-
1,1-diphenylsilacyclopenta-2,4-dien-2-yl]- (9CI) (CA INDEX NAME)

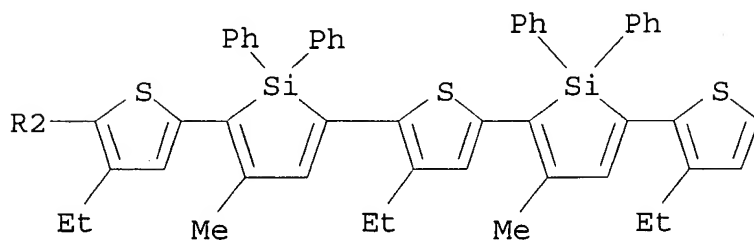
PAGE 1-A



PAGE 2-A



PAGE 3-A



IC ICM H01L051-20
 ICS C09K011-06
 CC 73-11 (Optical, Electron, and Mass Spectroscopy and Other Related Properties)
 Section cross-reference(s): 24, 76
 ST org **electroluminescent** device spiro compd
 IT Spiro compounds
 (org. **electroluminescent** devices employing spiro compds.)
 IT **Electroluminescent** devices
 (org.; org. **electroluminescent** devices employing spiro compds.)
 IT 2085-33-8, Tris(8-hydroxyquinolinato)aluminum 65181-78-4
 352351-93-0 352351-98-5 352352-01-3

352352-72-8 352352-84-2 352352-85-3 352352-87-5 352352-97-7
 352353-10-7 352353-31-2 352353-83-4 352353-84-5 352353-86-7
 352354-07-5 **352354-12-2 352354-25-7**
 352354-26-8 352354-27-9 352354-78-0 352354-95-1 352354-96-2
352424-58-9 352439-18-0 352439-33-9 352439-35-1
 352439-57-7 352439-60-2 352439-64-6 352439-65-7 352440-01-8
 352443-83-5 352445-17-1 352445-30-8 352445-39-7 352445-63-7
 352446-57-2 352455-41-5 352455-45-9 352455-66-4 352456-11-2
 352456-62-3 352456-63-4 352456-67-8

(org. **electroluminescent** devices employing spiro
 compds.)

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134:302823 Organic **electroluminescent** device components.

Kohama, Toru; Tominaga, Takeshi; Makiyama, Akira (Toray Industries, Inc., Japan). Jpn. Kokai Tokkyo Koho JP 2001118683 A2 20010427, 7 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 2000-223449 20000725. PRIORITY: JP 1999-228353 19990812.

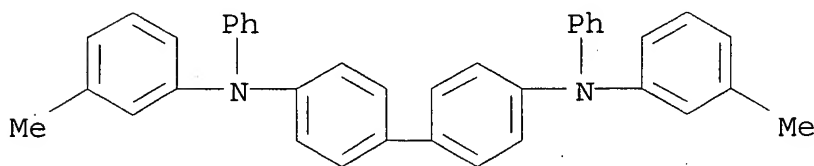
AB The components comprise a phosphor layer emitting a 440-460 nm light having a host and a guest material, the latter comprising an isobenzofuran deriv..

IT **65181-78-4**, TPD **123847-85-8**, .alpha.-NPD
124729-98-2, MTDATA **334001-92-2**

(**light emitting** device elements)

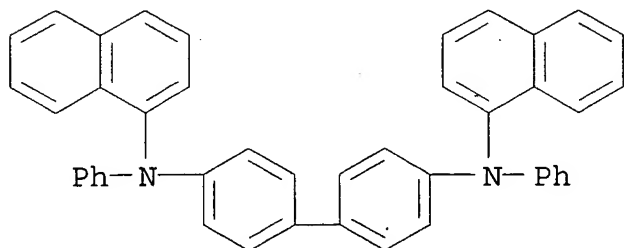
RN 65181-78-4 HCA

CN [1,1'-Biphenyl]-4,4'-diamine, N,N'-bis(3-methylphenyl)-N,N'-diphenyl-
 (9CI) (CA INDEX NAME)



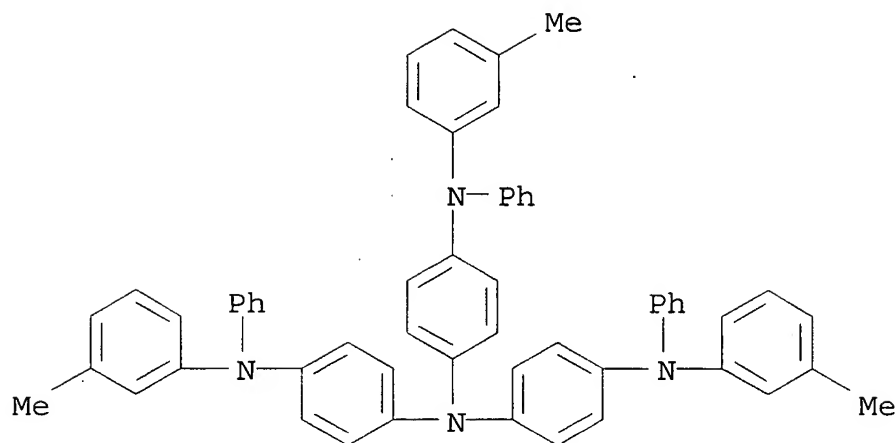
RN 123847-85-8 HCA

CN [1,1'-Biphenyl]-4,4'-diamine, N,N'-di-1-naphthalenyl-N,N'-diphenyl-
 (9CI) (CA INDEX NAME)



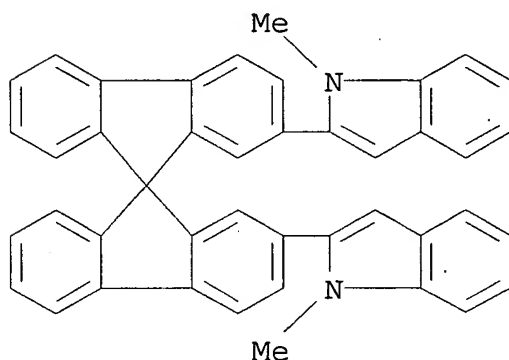
RN 124729-98-2 HCA

CN 1,4-Benzenediamine, N-(3-methylphenyl)-N',N'-bis[4-[(3-methylphenyl)phenylamino]phenyl]-N-phenyl- (9CI) (CA INDEX NAME)



RN 334001-92-2 HCA

CN 1H-Indole, 2,2'-(9,9'-spirobi[9H-fluorene]-2,2'-diyl)bis[1-methyl-(9CI) (CA INDEX NAME)



IC ICM H05B033-14

ICS C07D235-08; C07D307-87; C09K011-06; C07D209-14

CC 73-5 (Optical, Electron, and Mass Spectroscopy and Other Related Properties)

ST org **electroluminescent** device isobenzofuran phosphor

IT Color

Electrodes

Electroluminescent devices

Phosphors

(**light emitting** device elements)

IT 4733-39-5, 2,9-Dimethyl-4,7-diphenyl-1,10-phenanthroline

36951-27-6 50926-11-9, ITO 61200-11-1, 1,3-Dimethylisobenzofuran

65181-78-4, TPD 123847-85-8, .alpha.-NPD

124729-98-2, MTDATA 252873-65-7, 1,3-Di(2-

methylphenyl)isobenzofuran 334001-90-0 334001-91-1

334001-92-2 334001-93-3 334001-94-4 334001-95-5,

3-Methyl-7-dimethylaminocoumarin

(**light emitting** device elements)

L27 ANSWER 14 OF 23 HCA COPYRIGHT 2003 ACS

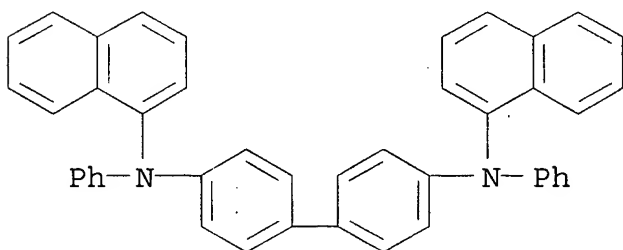
133:258976 Temperature stability of OLEDs using amorphous compounds with spiro-bifluorene core. Spreitzer, Hubert; Schenk, Hermann W.; Salbeck, Josef; Weisssoertel, Frank; Reil, Heike; Riess, Walter (Ind. Park Höchst, Covion Organic Semiconductors, Frankfurt, Germany). Proceedings of SPIE-The International Society for Optical Engineering, 3797(Organic Light-Emitting Materials and Devices III), 316-324 (English) 1999. CODEN: PSISDG. ISSN: 0277-786X.

AB The temp. stability of OLEDs was studied by observing the I-V and EL-V characteristics of various devices stored at elevated temp. (up to 140.degree.). Results reported in this paper concern the std. KODAK structure for a green **OLED** (i.e. anode/CuPc/NPB/AlQ3/cathode), the std. IDEMITSU structure for a blue **OLED** (i.e. anode/CuPc/NPB/DPVBi/AlQ3/cathode) and variants of those using high Tg materials consisting of a spiro-bifluorene core. Use of Spiro-TAD as a hole transport material (HTM) and of Spiro-DPVBi as an emitting material (EM) resulted in considerable improvements. While the initial performance of the virgin devices is considerably unchanged, the temp. stability increases dramatically: for the green **OLED** no significant deterioration up to 140.degree. is found, compared to the std. device including NPB already starting to degrade slightly >100.degree.; the blue **OLED** is stable up to .apprx.120.degree. (particularly the color coordinates of the **emitted light**) whereas the std. device using DPVBi already deteriorates at .apprx.80.degree..

IT 123847-85-8, NPB 128055-74-3, 2,2',7,7'-Tetrabromo-spiro-9,9'-bifluorene 189363-47-1 296269-66-4
(temp. stability of OLEDs using amorphous compds. with spiro-bifluorene core)

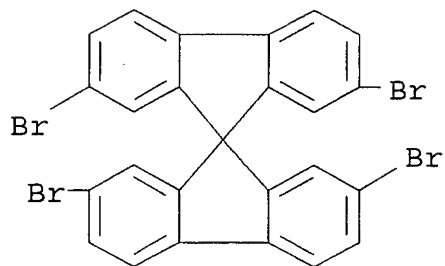
RN 123847-85-8 HCA

CN [1,1'-Biphenyl]-4,4'-diamine, N,N'-di-1-naphthalenyl-N,N'-diphenyl- (9CI) (CA INDEX NAME)

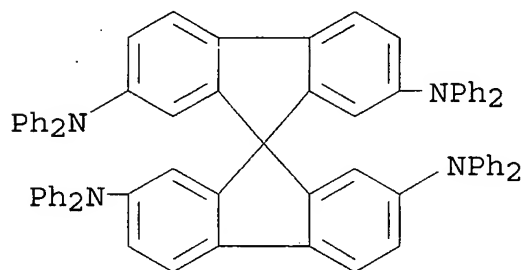


RN 128055-74-3 HCA

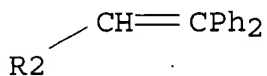
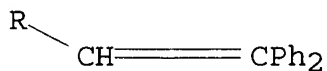
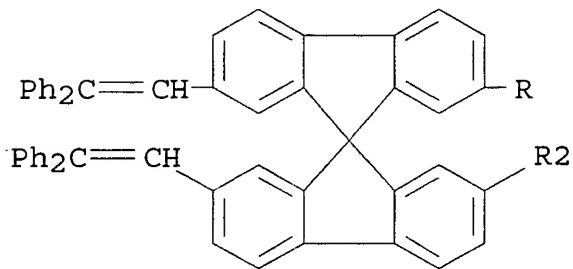
CN 9,9'-Spirobi[9H-fluorene], 2,2',7,7'-tetrabromo- (9CI) (CA INDEX NAME)



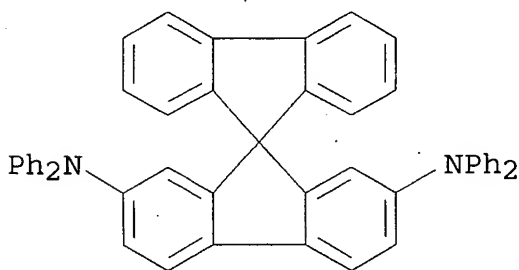
RN 189363-47-1 HCA

CN 9,9'-Spirobi[9H-fluorene]-2,2',7,7'-tetramine,
N,N,N',N',N'',N'',N''',N'''-octaphenyl- (9CI) (CA INDEX NAME)

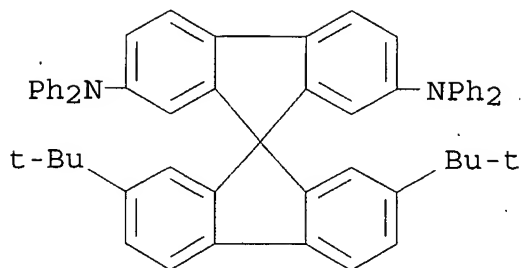
RN 296269-66-4 HCA

CN 9,9'-Spirobi[9H-fluorene], 2,2',7,7'-tetrakis(2,2-diphenylethenyl)-
(9CI) (CA INDEX NAME)

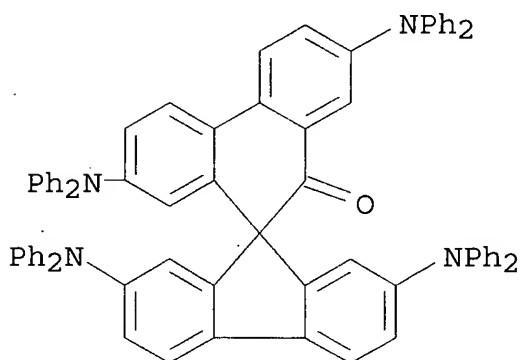
- CC 73-11 (Optical, Electron, and Mass Spectroscopy and Other Related Properties)
- IT **Electroluminescent** devices
Luminescence, **electroluminescence**
Thermal stability
(temp. stability of OLEDs using amorphous compds. with spiro-bifluorene core)
- IT 123847-85-8, NPB 128055-74-3, 2,2',7,7'-Tetrabromo-spiro-9,9'-bifluorene 142289-08-5 189363-47-1 296269-66-4
(temp. stability of OLEDs using amorphous compds. with spiro-bifluorene core)
- L27 ANSWER 15 OF 23 HCA COPYRIGHT 2003 ACS
- 132:229211 Spirocycle-incorporated triphenylamine derivatives as an advanced organic **electroluminescent** material.. Kimura, Makoto; Inoue, Shin-Ichiro; Shimada, Kou; Tokito, Shizuo; Noda, Koji; Taga, Yasunori; Sawaki, Yasuhiko (Department of Applied Chemistry, Graduate School of Engineering, Nagoya University, Nagoya, 464-8603, Japan). Chemistry Letters (2), 192-193 (English) 2000. CODEN: CMLTAG. ISSN: 0366-7022. Publisher: Chemical Society of Japan.
- AB For multi-color org. **electroluminescent** (EL) devices, new triphenylamine compds. attached to a spirocyclic framework were prepd. from 2,7-bis(diphenylamino)-9-fluorenone. These amines showed exceedingly high TG's or thermal stability as well as good electrochem. properties and sufficient EL characteristics, allowing practical application.
- IT 244301-18-6P 244301-19-7P 261517-63-9P
(spirocycle-incorporated triphenylamine derivs. as advanced org. **electroluminescent** material)
- RN 244301-18-6 HCA
- CN 9,9'-Spirobi[9H-fluorene]-2,7-diamine, N,N,N',N'-tetraphenyl- (9CI)
(CA INDEX NAME)



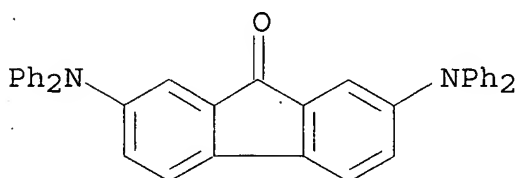
- RN 244301-19-7 HCA
- CN 9,9'-Spirobi[9H-fluorene]-2,7-diamine, 2',7'-bis(1,1-dimethylethyl)-N,N,N',N'-tetraphenyl- (9CI) (CA INDEX NAME)



RN 261517-63-9 HCA
 CN Spiro[9H-fluorene-9,9'-(10'H)-phenanthren]-10'-one,
 2,2',7,7'-tetrakis(diphenylamino)- (9CI) (CA INDEX NAME)

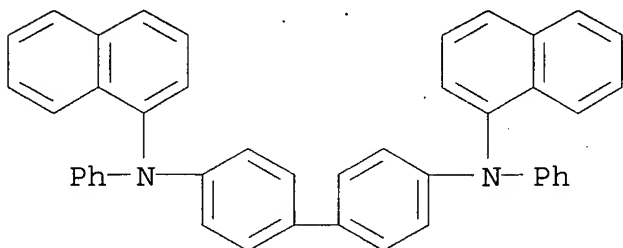


IT 113933-91-8P
 (spirocycle-incorporated triphenylamine derivs. as advanced org.
electroluminescent material)
 RN 113933-91-8 HCA
 CN 9H-Fluoren-9-one, 2,7-bis(diphenylamino)- (9CI) (CA INDEX NAME)

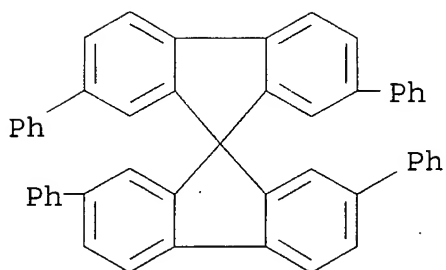


CC 73-11 (Optical, Electron, and Mass Spectroscopy and Other Related
 Properties)
 ST spirocycle triphenylamine **electroluminescent** device glass
 transition temp
 IT **Electroluminescent** devices
 Glass transition temperature
 Oxidation, electrochemical
 (spirocycle-incorporated triphenylamine derivs. as advanced org.
electroluminescent material)

- IT 244301-18-6P 244301-19-7P 261517-63-9P
(spirocycle-incorporated triphenylamine derivs. as advanced org.
electroluminescent material)
- IT 14348-75-5, 2,7-Dibromo-9-fluorenone
(spirocycle-incorporated triphenylamine derivs. as advanced org.
electroluminescent material)
- IT 113933-91-8P
(spirocycle-incorporated triphenylamine derivs. as advanced org.
electroluminescent material)
- L27 ANSWER 16 OF 23 HCA COPYRIGHT 2003 ACS
132:129772 White **light emission** from organic LEDs
utilizing spiro compounds with high-temperature stability. Steuber,
Frank; Staudigel, Jorg; Stossel, Matthias; Simmerer, Jorgen;
Winnacker, Albrecht; Spreitzer, Hubert; Weissortel, Frank; Salbeck,
Josef (Siemens A.-G., Erlangen, D-91052, Germany). Advanced
Materials (Weinheim, Germany), 12(2), 130-133 (English) 2000
. CODEN: ADVMEW. ISSN: 0935-9648. Publisher: Wiley-VCH Verlag
GmbH.
- AB Direct white **light emission** from org. LEDs with
high-temp. stability using spiro-linked low mol. wt. structures was
demonstrated. The thermal stability was characterized. The
emission spectra were optimized to achieve ideal white light.
- IT 123847-85-8 171408-92-7, 2,2',4,4'-Tetraphenyl-
9,9'-spirobifluorene 171408-94-9, 2,2',4,4',7,7'-Hexakis(4-
biphenyl)-9,9'-spirobifluorene
(**emitting** layer; white **light emission**
from org. LEDs with spiro compds. as emitting layer with
high-temp. stability)
- RN 123847-85-8 HCA
CN [1,1'-Biphenyl]-4,4'-diamine, N,N'-di-1-naphthalenyl-N,N'-diphenyl-
(9CI) (CA INDEX NAME)

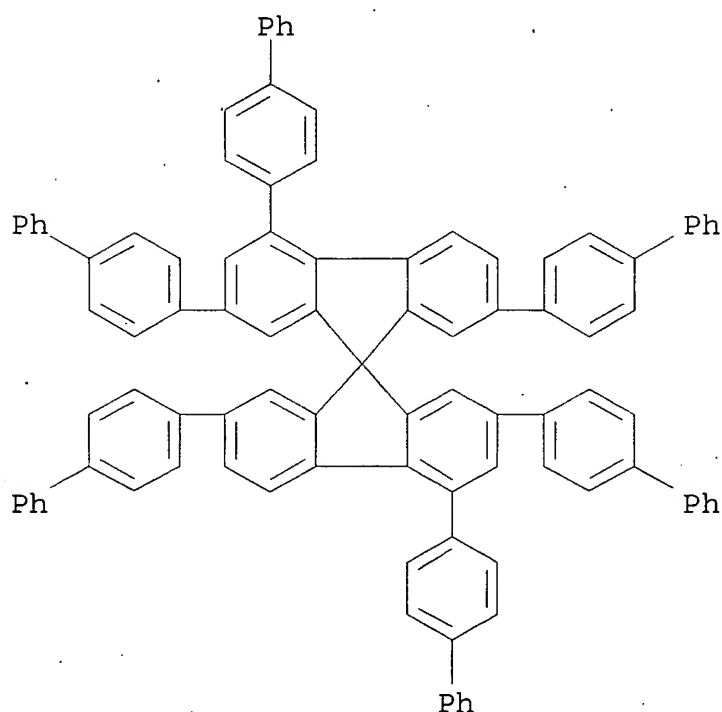


- RN 171408-92-7 HCA
CN 9,9'-Spirobi[9H-fluorene], 2,2',7,7'-tetraphenyl- (9CI) (CA INDEX
NAME)



RN 171408-94-9 HCA

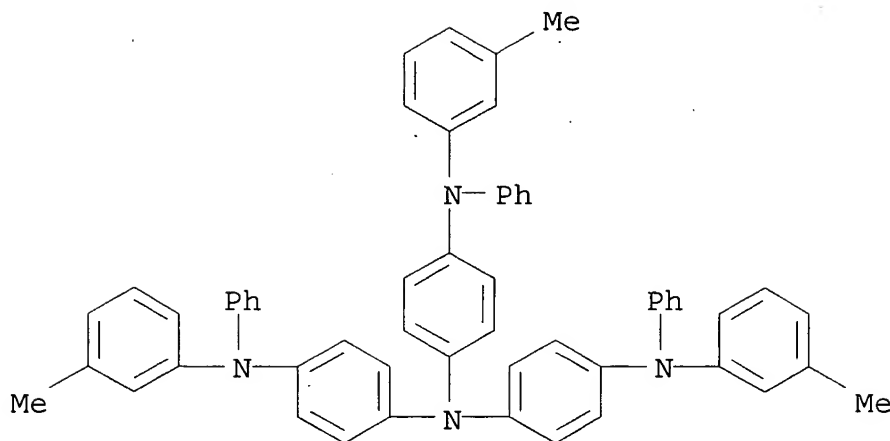
CN 9,9'-Spiro[9H-fluorene], 2,2',4,4',7,7'-hexakis([1,1'-biphenyl]-4-yl)- (9CI) (CA INDEX NAME)



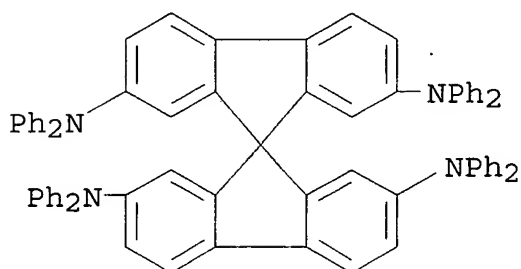
IT 124729-98-2, 4,4',4''-Tris(N-(3-methylphenyl)-N-phenylamino)triphenylamine 189363-47-1, 2,2',7,7'-Tetrakis(diphenylamino)-9,9'-spirobifluorene (hole transport layer; white light emission from org. LEDs with spiro compds. as emitting layer with high-temp. stability)

RN 124729-98-2 HCA

CN 1,4-Benzenediamine, N-(3-methylphenyl)-N',N'-bis[4-[(3-methylphenyl)phenylamino]phenyl]-N-phenyl- (9CI) (CA INDEX NAME)



RN 189363-47-1 HCA
 CN 9,9'-Spirobi[9H-fluorene]-2,2',7,7'-tetramine,
 N,N,N',N',N'',N'',N''',N''''-octaphenyl- (9CI) (CA INDEX NAME)



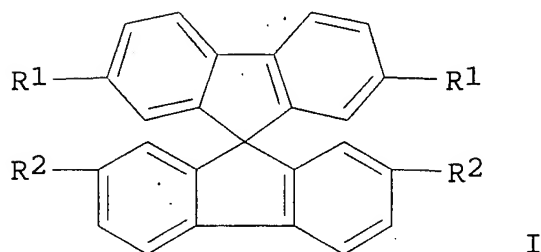
CC 73-12 (Optical, Electron, and Mass Spectroscopy and Other Related Properties)
 Section cross-reference(s): 22, 76
 ST LED org white **light emission** spiro compd thermal stability; glass transition temp spiro compd LED emitting layer; elec property white LED spiro compd emitting layer
 IT Current density
 (of white **light emitting** org. LEDs with spiro compds. as emitting layer)
 IT Glass transition temperature
 (of white **light emitting** org. LEDs with spiro compds. as emitting layer with high-temp. stability)
 IT Luminescence, **electroluminescence**
 (white **light emission** from org. LEDs with spiro compds. as emitting layer with high-temp. stability)
 IT **Electroluminescent** devices
 (white; white **light emission** from org. LEDs with spiro compds. as emitting layer with high-temp. stability)
 IT 517-51-1, Rubrene
 (dopant in spiro compd. **emitting** layer; white

- light emission** from org. LEDs with spiro compds. as emitting layer with high-temp. stability)
- IT 2085-33-8, Hydroxyquinolinealuminum (electron transport layer; white **light emission** from org. LEDs with spiro compds. as emitting layer with high-temp. stability)
- IT 123847-85-8 171408-92-7, 2,2',4,4'-Tetraphenyl-9,9'-spirobifluorene 171408-94-9, 2,2',4,4',7,7'-Hexakis(4-biphenyl)-9,9'-spirobifluorene (**emitting layer**; white **light emission** from org. LEDs with spiro compds. as emitting layer with high-temp. stability)
- IT 124729-98-2, 4,4',4''-Tris(N-(3-methylphenyl)-N-phenylamino)triphenylamine 189363-47-1, 2,2',7,7'-Tetrakis(diphenylamino)-9,9'-spirobifluorene (hole transport layer; white **light emission** from org. LEDs with spiro compds. as emitting layer with high-temp. stability)

L27 ANSWER 17 OF 23 HCA COPYRIGHT 2003 ACS

131:250226 Organic **electroluminescent** device comprising spiro compound with fluorene-skeleton. Tokito, Seishi; Taka, Yasunori; Sawaki, Yasuhiko; Kimura, Makoto; Inoue, Shinichiro (Toyota Central Research and Development Laboratories, Inc., Japan). Jpn. Kokai Tokkyo Koho JP 11273863 A2 19991008 Heisei, 8 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1998-77456 19980325.

GI



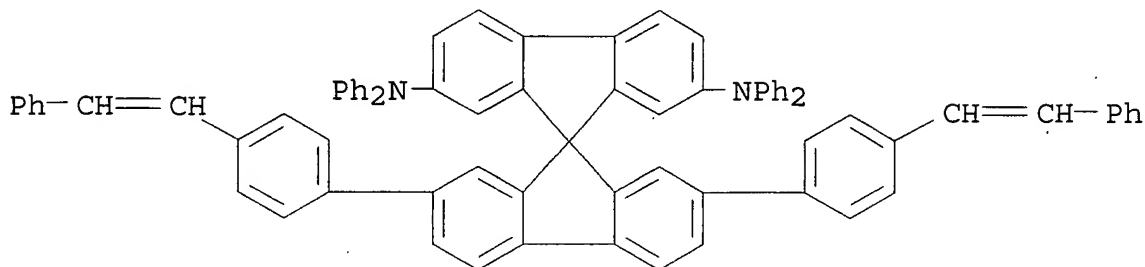
AB The invention relates to an org. **electroluminescent** device, wherein .gtoreq.1 org. layers comprise an asym. spiro compd. having a fluorene-skeleton, represented by I [R1,2 = dissimilar groups selected from H, alkyl, Ph, diarylamino, etc.], for improving the heat resistant properties of the device.

IT 244301-15-3 244301-16-4 244301-17-5
244301-18-6 244301-19-7

(org. **electroluminescent** device comprising spiro compd. with fluorene-skeleton)

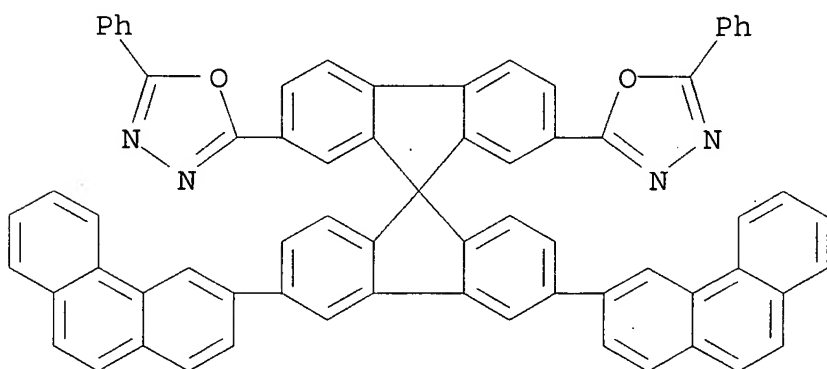
RN 244301-15-3 HCA

CN 9,9'-Spirobi[9H-fluorene]-2,7-diamine, N,N,N',N'-tetraphenyl-2',7'-bis[4-(2-phenylethenyl)phenyl]- (9CI) (CA INDEX NAME)



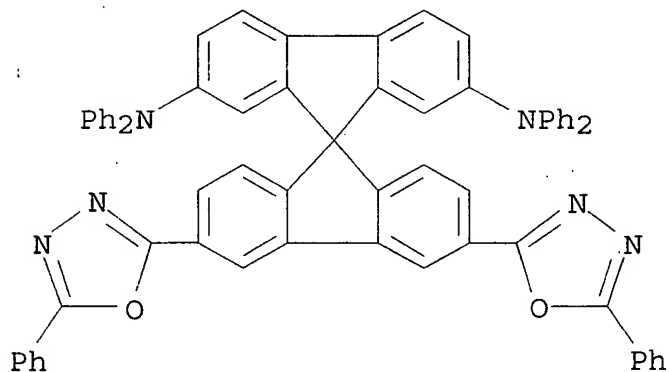
RN 244301-16-4 HCA

CN 1,3,4-Oxadiazole, 2,2'-(3',6'-di-3-phenanthrenyl-9,9'-spirobi[9H-fluorene]-2,7-diyl)bis[5-phenyl- (9CI) (CA INDEX NAME)



RN 244301-17-5 HCA

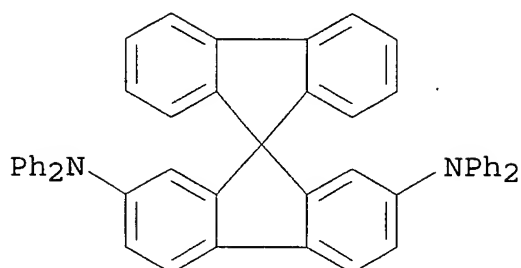
CN 9,9'-Spirobi[9H-fluorene]-2,7-diamine, N,N,N',N'-tetraphenyl-3',6'-bis(5-phenyl-1,3,4-oxadiazol-2-yl)- (9CI) (CA INDEX NAME)



RN 244301-18-6 HCA

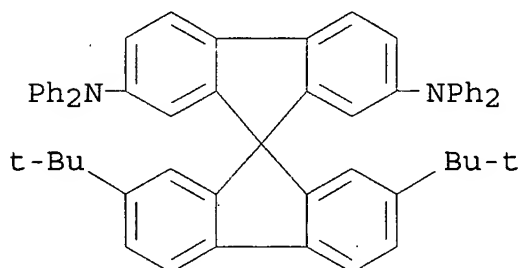
CN 9,9'-Spirobi[9H-fluorene]-2,7-diamine, N,N,N',N'-tetraphenyl- (9CI)

(CA INDEX NAME)



RN 244301-19-7 HCA

CN 9,9'-Spirobi[9H-fluorene]-2,7-diamine, 2',7'-bis(1,1-dimethylethyl)-N,N,N',N'-tetraphenyl- (9CI) (CA INDEX NAME)



IC ICM H05B033-14

ICS C09K011-06; H05B033-22

CC 73-11 (Optical, Electron, and Mass Spectroscopy and Other Related Properties)

ST org **electroluminescent** device asym spiro compd fluorene skeleton

IT Spiro compounds

(asym.; org. **electroluminescent** device comprising spiro compd. with fluorene-skeleton)IT **Electroluminescent** devices(org. **electroluminescent** device comprising spiro compd. with fluorene-skeleton)

IT 244301-15-3 244301-16-4 244301-17-5

244301-18-6 244301-19-7

(org. **electroluminescent** device comprising spiro compd. with fluorene-skeleton)

L27 ANSWER 18 OF 23 HCA COPYRIGHT 2003 ACS

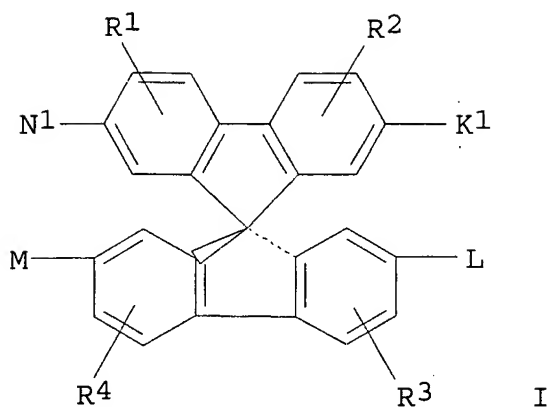
129:297239 Spiro compounds and their uses. Salbeck, Josef; Lupo, Donald (Hoechst Research and Technology Deutschland GmbH and Co. K.-G., Germany). PCT Int. Appl. WO 9842655 A1 19981001, 68 pp.

DESIGNATED STATES: W: CN, JP, US; RW: AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE. (German). CODEN: PIXXD2.

APPLICATION: WO 1998-EP1559 19980318. PRIORITY: DE 1997-19711714

19970320.

GI



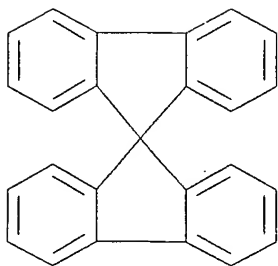
AB Spirobifluorene derivs. (I; K1,L,M,N1,R1-4 = H, NO2, CN, F, Cl, branched or linear alkyl contg. O, S, CO2, O2C, substituted N, SiMe3, unsatd. groups, or F and/or Cl, an amino group- or arylamino group-contg. arom. group, aryl group, or heterocyclyl-contg. group) are suitable for use as charge-transfer materials, esp. for photovoltaic cells, and as **electroluminescent** materials.

IT 159-66-0P, 9,9'-Spirobifluorene 22824-82-4P
 22824-84-6P 67665-45-6P, 9,9'-Spirobi[9H-fluorene]-
 2,2'-diamine 67665-46-7P 67665-47-8P,
 2,2'-Dibromo-9,9'-Spirobifluorene 67665-48-9P
 70657-80-6P 70657-81-7P, 9,9'-Spirobi[9H-
 fluorene], 2,2'-bis(bromomethyl)- 101636-06-0P
 124575-67-3P 128055-74-3P, 9,9'-Spirobi[9H-
 fluorene], 2,2',7,7'-tetrabromo- 137181-59-0P,
 9,9'-Spirobi[9H-fluorene], 2,2',7,7'-tetraiodo- 171408-82-5P
 171408-83-6P, 9,9'-Spirobi[9H-fluorene],
 2,2',4,4',7,7'-hexabromo- 171408-84-7P,
 9,9'-Spirobi[9H-fluorene], 2,7-dibromo- 171408-86-9P
 214078-85-0P

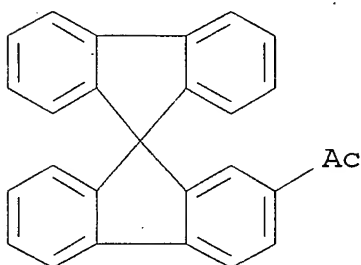
(prepn. and reaction of; in synthesis of spirobifluorene derivs.
 for use as charge-transfer materials)

RN 159-66-0 HCA

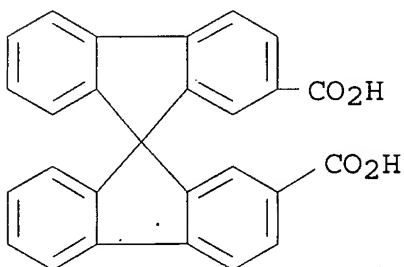
CN 9,9'-Spirobi[9H-fluorene] (9CI) (CA INDEX NAME)



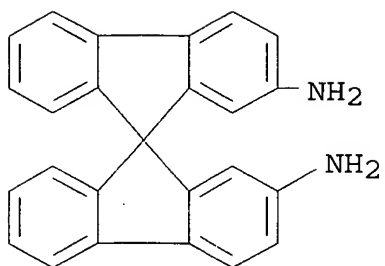
RN 22824-82-4 HCA
CN Ethanone, 1-(9,9'-spirobi[9H-fluorene]-2-yl)- (9CI) (CA INDEX NAME)



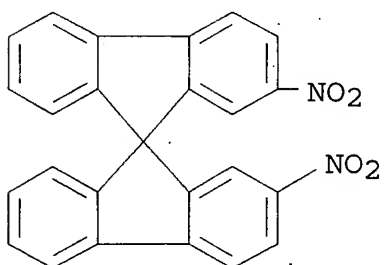
RN 22824-84-6 HCA
CN 9,9'-Spirobi[9H-fluorene]-2,2'-dicarboxylic acid (9CI) (CA INDEX NAME)



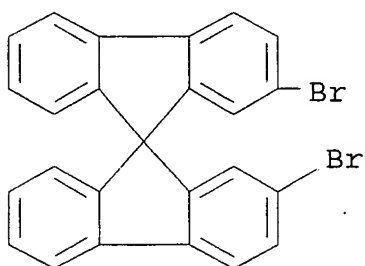
RN 67665-45-6 HCA
CN 9,9'-Spirobi[9H-fluorene]-2,2'-diamine (9CI) (CA INDEX NAME)



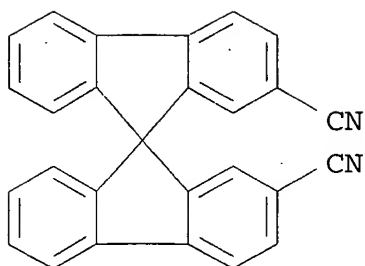
RN 67665-46-7 HCA
CN 9,9'-Spirobi[9H-fluorene], 2,2'-dinitro- (9CI) (CA INDEX NAME)



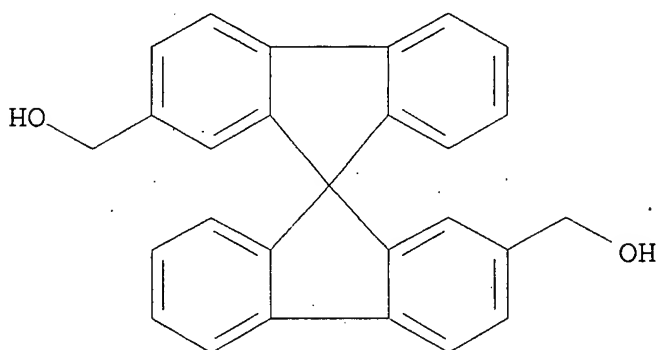
RN	67665-47-8	HCA		
CN	9,9'-Spirobi[9H-fluorene], 2,2'-dibromo- (9CI) (CA INDEX NAME)			



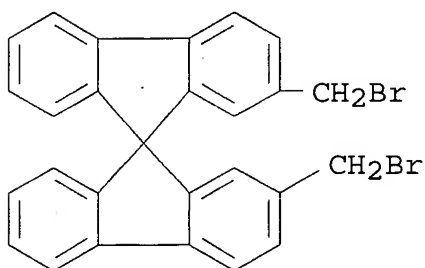
RN	67665-48-9	HCA	
CN	9,9'-Spirobi[9H-fluorene]-2,2'-dicarbonitrile (9CI) (CA INDEX NAME)		



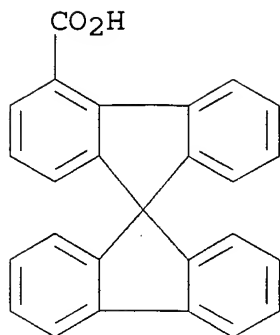
RN 70657-80-6 HCA
CN 9,9'-Spirobi[9H-fluorene]-2,2'-dimethanol (9CI) (CA INDEX NAME)



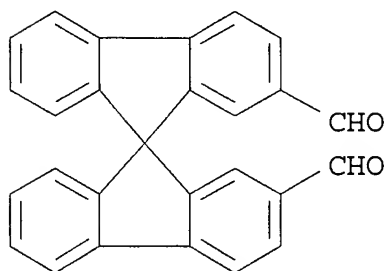
RN 70657-81-7 HCA
CN 9,9'-Spirobi[9H-fluorene], 2,2'-bis(bromomethyl)- (9CI) (CA INDEX NAME)



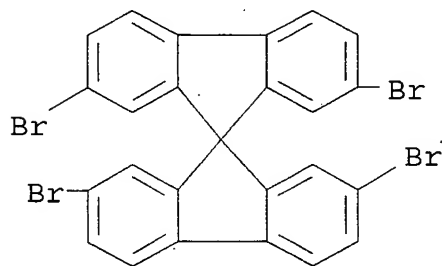
RN 101636-06-0 HCA
CN 9,9'-Spirobi[9H-fluorene]-4-carboxylic acid (9CI) (CA INDEX NAME)



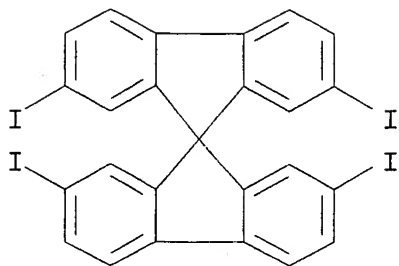
RN 124575-67-3 HCA
CN 9,9'-Spirobi[9H-fluorene]-2,2'-dicarboxaldehyde (9CI) (CA INDEX NAME)



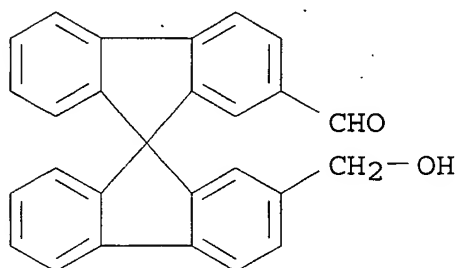
RN 128055-74-3 HCA
CN 9,9'-Spirobi[9H-fluorene], 2,2',7,7'-tetrabromo- (9CI) (CA INDEX NAME)



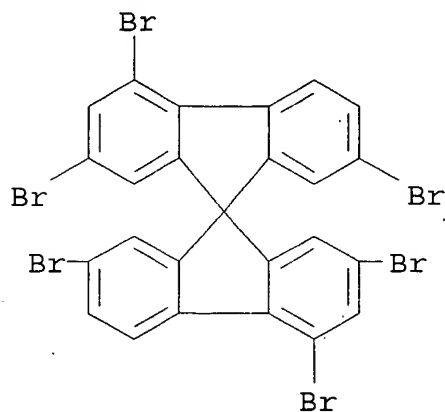
RN 137181-59-0 HCA
CN 9,9'-Spirobi[9H-fluorene], 2,2',7,7'-tetraiodo- (9CI) (CA INDEX NAME)



RN 171408-82-5 HCA

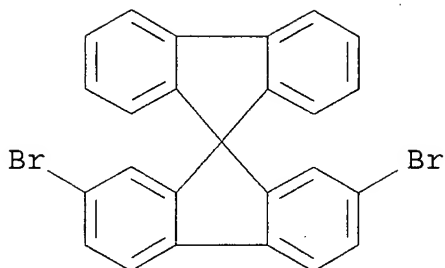
CN 9,9'-Spirobi[9H-fluorene]-2-carboxaldehyde, 2'-(hydroxymethyl)-
(9CI) (CA INDEX NAME)

RN 171408-83-6 HCA

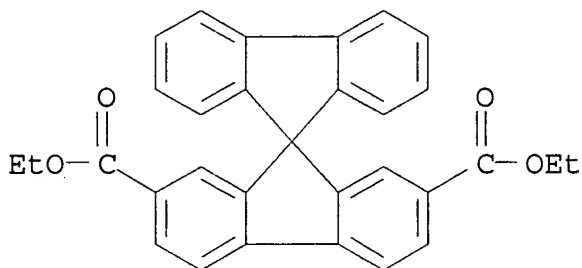
CN 9,9'-Spirobi[9H-fluorene], 2,2',4,4',7,7'-hexabromo-. (9CI) (CA
INDEX NAME)

RN 171408-84-7 HCA

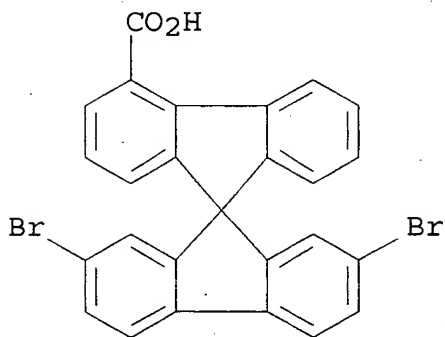
CN 9,9'-Spirobi[9H-fluorene], 2,7-dibromo- (9CI) (CA INDEX NAME)



RN 171408-86-9 HCA

CN 9,9'-Spirobi[9H-fluorene]-2,7-dicarboxylic acid, diethyl ester (9CI)
(CA INDEX NAME)

RN 214078-85-0 HCA

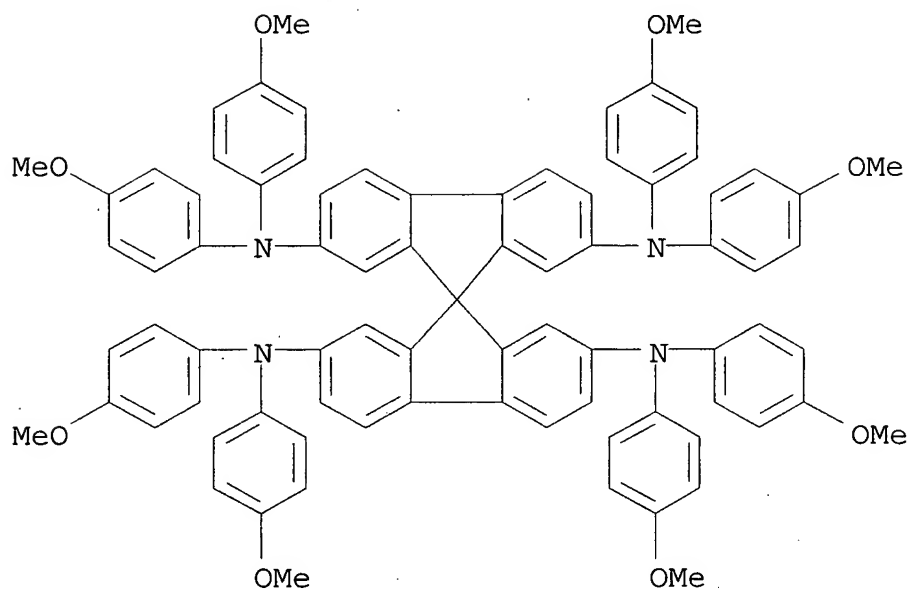
CN 9,9'-Spirobi[9H-fluorene]-4-carboxylic acid, 2',7'-dibromo- (9CI)
(CA INDEX NAME)

IT 207739-72-8P 214078-86-1P

(prepn. of; for use as charge-transfer materials)

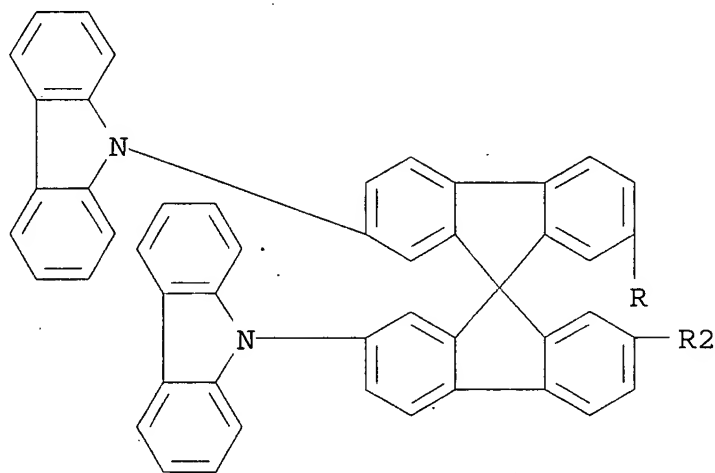
RN 207739-72-8 HCA

CN 9,9'-Spirobi[9H-fluorene]-2,2',7,7'-tetramine,
N,N,N',N',N'',N'',N''',N''',N''''-octakis(4-methoxyphenyl)- (9CI) (CA
INDEX NAME)

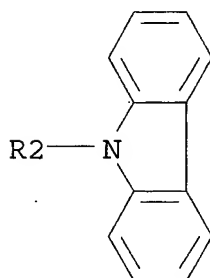
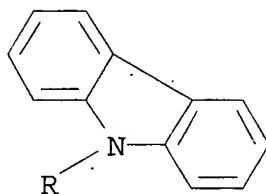


RN 214078-86-1 HCA
CN 9H-Carbazole, 9,9',9'',9'''-(9,9'-spirobi[9H-fluorene]-2,2',7,7'-tetrayl)tetrakis-(9CI) (CA INDEX NAME)

PAGE 1-A



PAGE 2-A



- IC ICM C07C217-94
ICS C07D209-86; C09K011-06; H05B033-14; H01L051-30
- CC 76-5 (Electric Phenomena)
Section cross-reference(s): 52, 73
- ST spirobifluorene deriv use; charge transfer material spirobifluorene deriv; photovoltaic cell spirobifluorene deriv;
electroluminescent material spirobifluorene deriv
- IT Phosphors
(**electroluminescent**; spirobifluorene derivs. as)
- IT Spiro compounds
(spirobifluorene derivs. for use as charge-transfer materials and **electroluminescent** materials)
- IT 159-66-0P, 9,9'-Spirobifluorene 22824-82-4P
22824-84-6P 67665-45-6P, 9,9'-Spirobi[9H-fluorene]-
2,2'-diamine 67665-46-7P 67665-47-8P,
2,2'-Dibromo-9,9'-Spirobifluorene 67665-48-9P
70657-80-6P 70657-81-7P, 9,9'-Spirobi[9H-
fluorene], 2,2'-bis(bromomethyl)- 101636-06-0P
124575-67-3P 128055-74-3P, 9,9'-Spirobi[9H-
fluorene], 2,2',7,7'-tetrabromo- 137181-59-0P,
9,9'-Spirobi[9H-fluorene], 2,2',7,7'-tetraiodo- 171408-82-5P
171408-83-6P, 9,9'-Spirobi[9H-fluorene],
2,2',4,4',7,7'-hexabromo- 171408-84-7P,
9,9'-Spirobi[9H-fluorene], 2,7-dibromo- 171408-86-9P
214078-85-0P
(prepn. and reaction of; in synthesis of spirobifluorene derivs.
for use as charge-transfer materials)
- IT 207739-72-8P 214078-86-1P
(prepn. of; for use as charge-transfer materials)

L27 ANSWER 19 OF 23 HCA COPYRIGHT 2003 ACS

129:296233 Organic **electroluminescent** device containing tertiary aromatic amines and polycyclic aromatic hydrocarbons. Xie, Shuang; Hu, Nan-xing; Popovic, Zoran D.; Hor, Ah-mee; Ong, Beng S. (Xerox Corp., Japan). Jpn. Kokai Tokkyo Koho JP 10255985 A2 19980925 Heisei, 10 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1998-47122 19980227. PRIORITY: US 1997-807489 19970227.

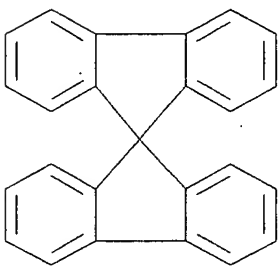
AB The **EL** device has an anode, an org. layer contg. tertiary arom. amines and polycyclic arom. hydrocarbons for pos. hole implanting and transporting, an org. layer for electron implanting and transporting, and a cathode. The device shows stabilized driving property and high luminescence under low voltage.

IT 159-66-0, 9,9'-Spirobifluorene 20441-06-9
65181-78-4, N,N'-Diphenyl-N,N'-bis(3-methylphenyl)-1,1'-biphenyl-4,4'-diamine 76185-65-4 123847-85-8
123847-87-0 134008-76-7 134008-77-8
139255-17-7 195443-35-7 204326-94-3
204326-95-4 204326-96-5 204326-97-6
204326-98-7 204326-99-8 204327-00-4
204327-01-5 204327-02-6 204327-03-7
214341-85-2 214341-87-4

(**electroluminescent** device contg. tertiary arom. amines and polycyclic arom. hydrocarbons for pos. hole-implanting and transporting)

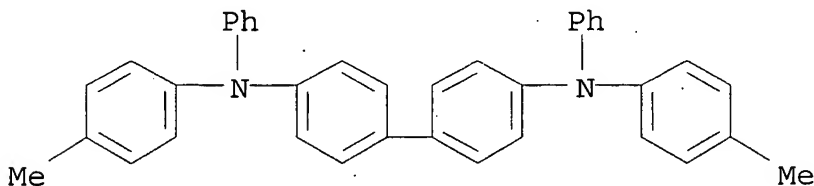
RN 159-66-0 HCA

CN 9,9'-Spirobi[9H-fluorene] (9CI) (CA INDEX NAME)

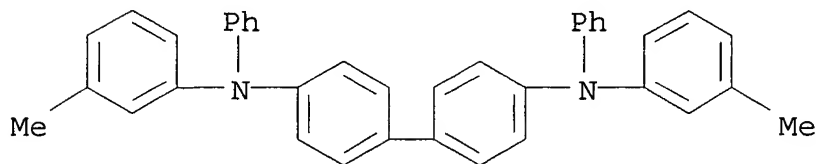


RN 20441-06-9 HCA

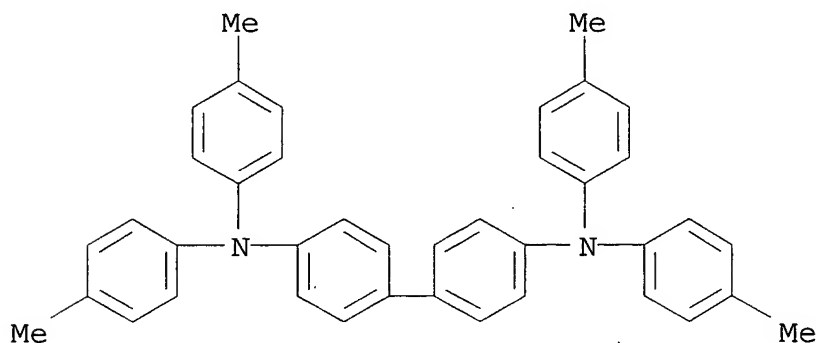
CN [1,1'-Biphenyl]-4,4'-diamine, N,N'-bis(4-methylphenyl)-N,N'-diphenyl- (9CI) (CA INDEX NAME)



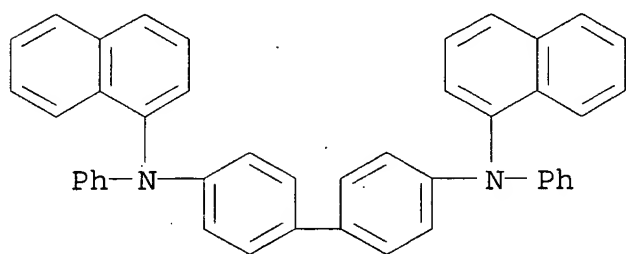
RN 65181-78-4 HCA

CN [1,1'-Biphenyl]-4,4'-diamine, N,N'-bis(3-methylphenyl)-N,N'-diphenyl-
(9CI) (CA INDEX NAME)

RN 76185-65-4 HCA

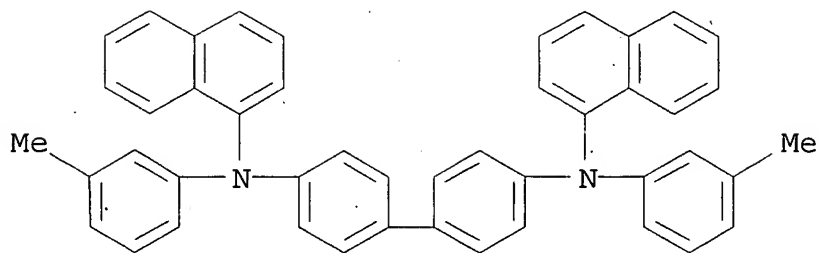
CN [1,1'-Biphenyl]-4,4'-diamine, N,N,N',N'-tetrakis(4-methylphenyl)-
(9CI) (CA INDEX NAME)

RN 123847-85-8 HCA

CN [1,1'-Biphenyl]-4,4'-diamine, N,N'-di-1-naphthalenyl-N,N'-diphenyl-
(9CI) (CA INDEX NAME)

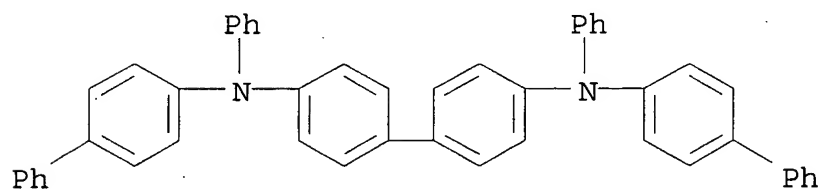
RN 123847-87-0 HCA

CN [1,1'-Biphenyl]-4,4'-diamine, N,N'-bis(3-methylphenyl)-N,N'-di-1-naphthalenyl- (9CI) (CA INDEX NAME)



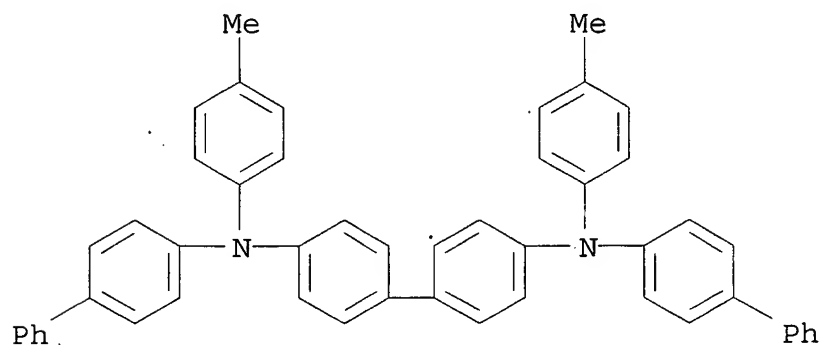
RN 134008-76-7 HCA

CN [1,1'-Biphenyl]-4,4'-diamine, N,N'-bis([1,1'-biphenyl]-4-yl)-N,N'-diphenyl- (9CI) (CA INDEX NAME)



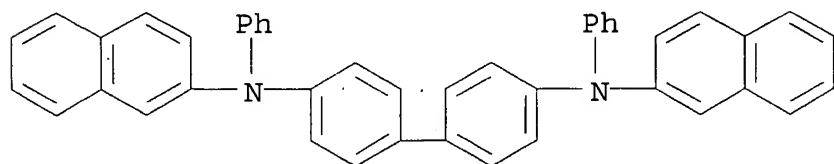
RN 134008-77-8 HCA

CN [1,1'-Biphenyl]-4,4'-diamine, N,N'-bis([1,1'-biphenyl]-4-yl)-N,N'-bis(4-methylphenyl)- (9CI) (CA INDEX NAME)



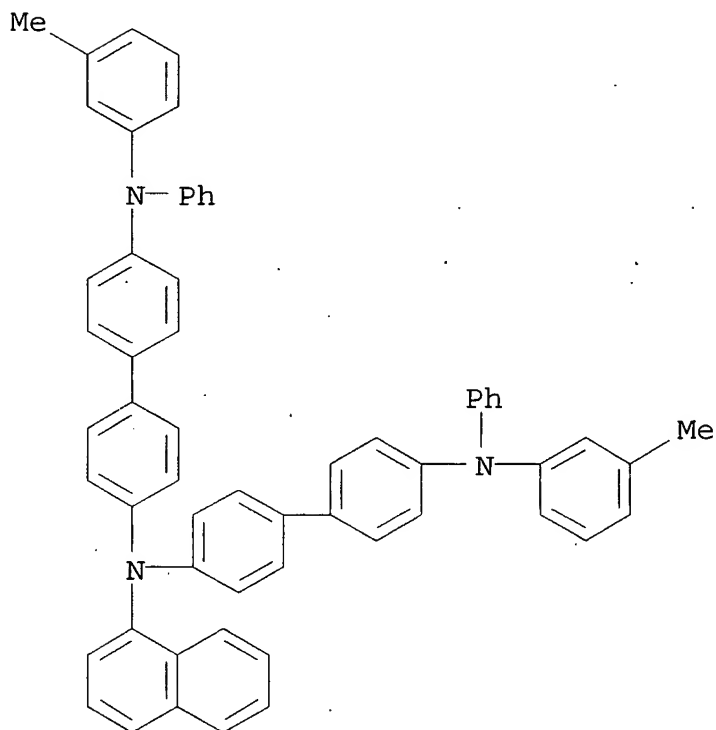
RN 139255-17-7 HCA

CN [1,1'-Biphenyl]-4,4'-diamine, N,N'-di-2-naphthalenyl-N,N'-diphenyl- (9CI) (CA INDEX NAME)



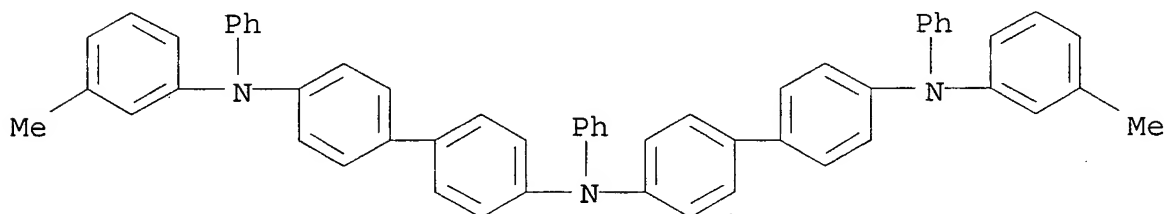
RN 195443-35-7 HCA

CN [1,1'-Biphenyl]-4,4'-diamine, N-(3-methylphenyl)-N'-[4'-[(3-methylphenyl)phenylamino][1,1'-biphenyl]-4-yl]-N'-1-naphthalenyl-N-phenyl- (9CI) (CA INDEX NAME)



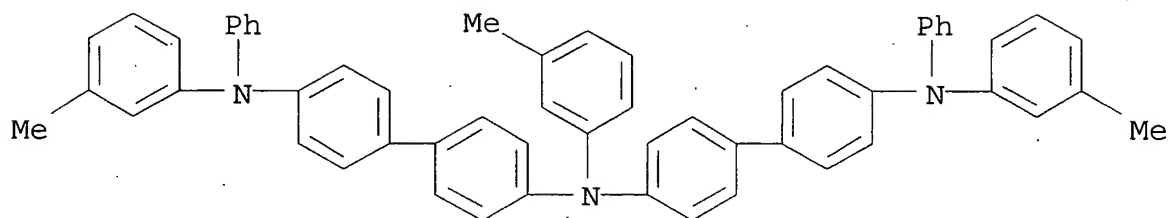
RN 204326-94-3 HCA

CN [1,1'-Biphenyl]-4,4'-diamine, N-(3-methylphenyl)-N'-[4'-[(3-methylphenyl)phenylamino][1,1'-biphenyl]-4-yl]-N,N'-diphenyl- (9CI) (CA INDEX NAME)



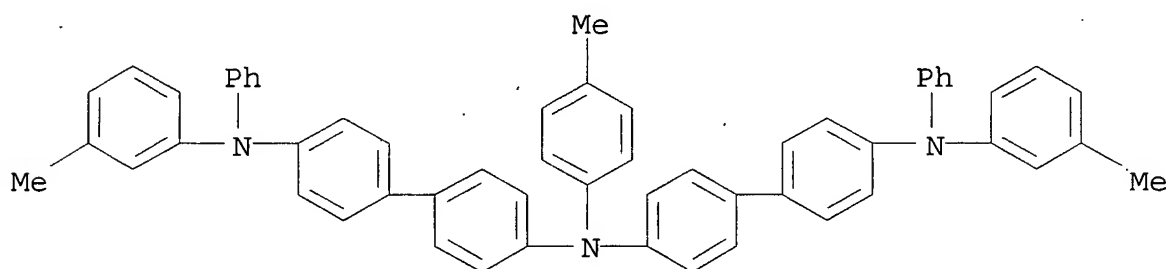
RN 204326-95-4 HCA

CN [1,1'-Biphenyl]-4,4'-diamine, N,N'-bis(3-methylphenyl)-N-[4'-[(3-methylphenyl)phenylamino][1,1'-biphenyl]-4-yl]-N'-phenyl- (9CI) (CA INDEX NAME)



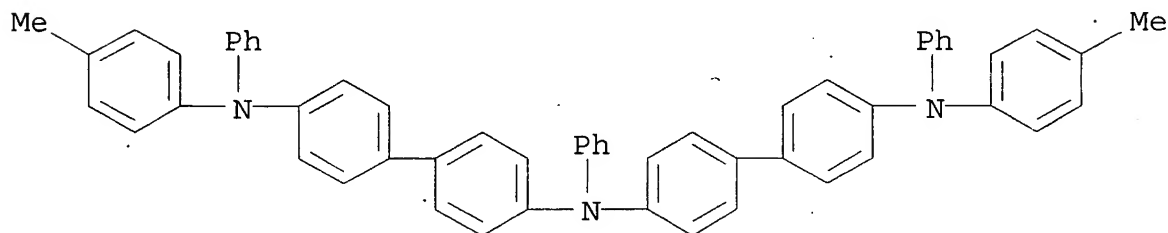
RN 204326-96-5 HCA

CN [1,1'-Biphenyl]-4,4'-diamine, N-(3-methylphenyl)-N'-(4-methylphenyl)-
N'-[4'-[(3-methylphenyl)phenylamino][1,1'-biphenyl]-4-yl]-N-phenyl-
(9CI) (CA INDEX NAME)



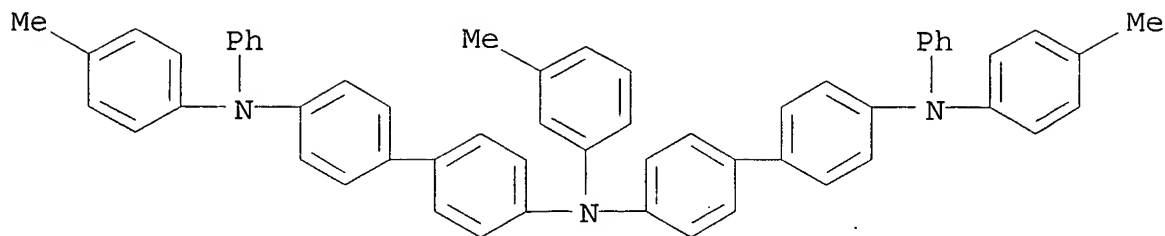
RN 204326-97-6 HCA

CN [1,1'-Biphenyl]-4,4'-diamine, N-(4-methylphenyl)-N'-[4'-[(4-
methylphenyl)phenylamino][1,1'-biphenyl]-4-yl]-N,N'-diphenyl- (9CI)
(CA INDEX NAME)



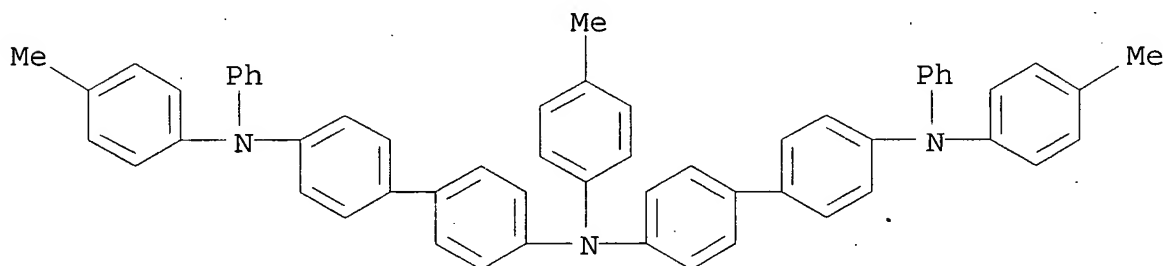
RN 204326-98-7 HCA

CN [1,1'-Biphenyl]-4,4'-diamine, N-(3-methylphenyl)-N'-(4-methylphenyl)-
N'-[4'-[(4-methylphenyl)phenylamino][1,1'-biphenyl]-4-yl]-N'-phenyl-
(9CI) (CA INDEX NAME)



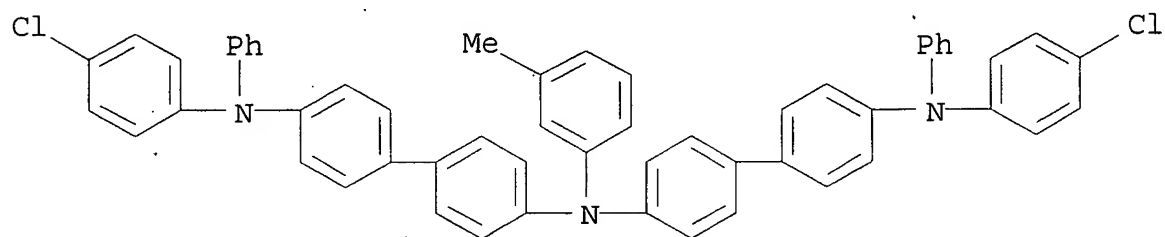
RN 204326-99-8 HCA

CN [1,1'-Biphenyl]-4,4'-diamine, N,N'-bis(4-methylphenyl)-N-[4'-[(4-methylphenyl)phenylamino][1,1'-biphenyl]-4-yl]-N'-phenyl- (9CI) (CA INDEX NAME)



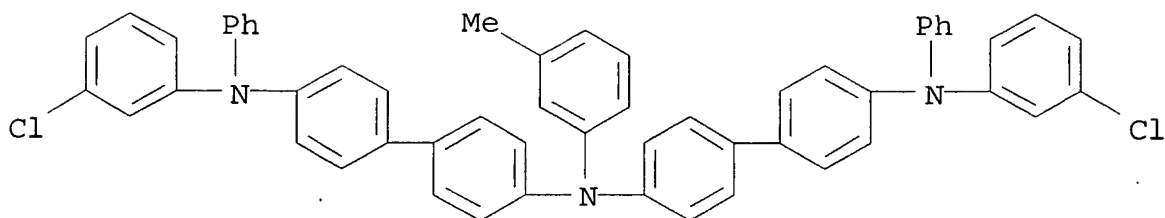
RN 204327-00-4 HCA

CN [1,1'-Biphenyl]-4,4'-diamine, N-(4-chlorophenyl)-N'-[4'-[(4-chlorophenyl)phenylamino][1,1'-biphenyl]-4-yl]-N'-(3-methylphenyl)-N-phenyl- (9CI) (CA INDEX NAME)



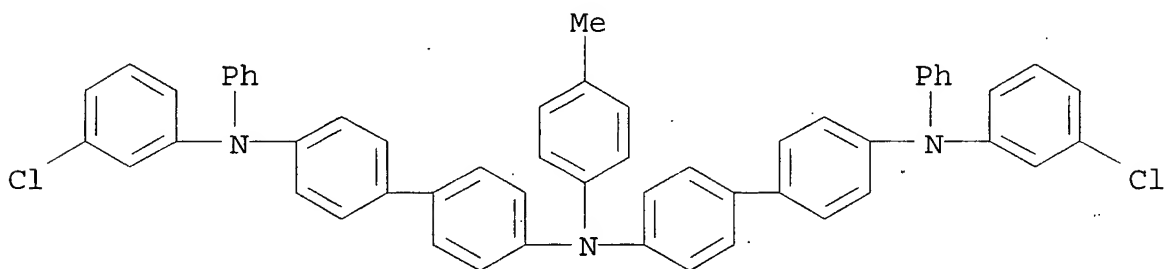
RN 204327-01-5 HCA

CN [1,1'-Biphenyl]-4,4'-diamine, N-(3-chlorophenyl)-N'-[4'-[(3-chlorophenyl)phenylamino][1,1'-biphenyl]-4-yl]-N'-(3-methylphenyl)-N-phenyl- (9CI) (CA INDEX NAME)



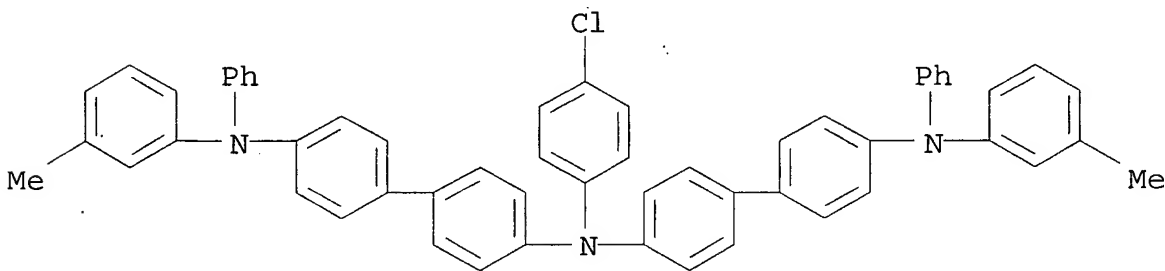
RN 204327-02-6 HCA

CN [1,1'-Biphenyl]-4,4'-diamine, N-(3-chlorophenyl)-N'-[4'-[(3-chlorophenyl)phenylamino][1,1'-biphenyl]-4-yl]-N'-(4-methylphenyl)-N-phenyl- (9CI) (CA INDEX NAME)



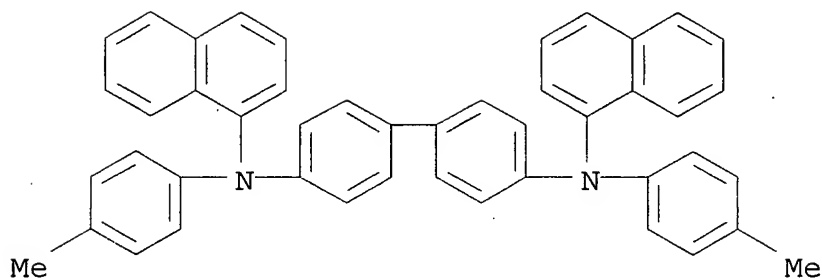
RN 204327-03-7 HCA

CN [1,1'-Biphenyl]-4,4'-diamine, N-(4-chlorophenyl)-N'-[3'-[(3-methylphenyl)phenylamino][1,1'-biphenyl]-3-yl]-N'-(3-methylphenyl)-N-phenyl- (9CI) (CA INDEX NAME)



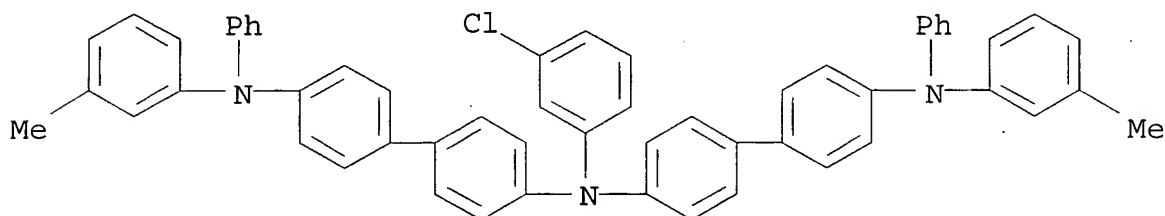
RN 214341-85-2 HCA

CN [1,1'-Biphenyl]-4,4'-diamine, N,N'-bis(4-methylphenyl)-N,N'-di-1-naphthalenyl- (9CI) (CA INDEX NAME)



RN 214341-87-4 HCA

CN [1,1'-Biphenyl]-4,4'-diamine, N-(3-chlorophenyl)-N'-(3-methylphenyl)-
N-[4'-[(3-methylphenyl)phenylamino][1,1'-biphenyl]-4-yl]-N'-phenyl-
(9CI) (CA INDEX NAME)



IC ICM H05B033-22

ICS H05B033-22; H05B033-14; C09K011-06

CC 74-13 (Radiation Chemistry, Photochemistry, and Photographic and
Other Reprographic Processes)

ST **electroluminescent** device tertiary arom amine; polycyclic
arom hydrocarbon **electroluminescent** device; pos hole
implanting transporting layer

IT **Electroluminescent** devices

(**electroluminescent** device contg. tertiary arom. amines
and polycyclic arom. hydrocarbons for pos. hole-implanting and
transporting)

IT 50-32-8, Benzo[a]pyrene, uses 53-70-3, Dibenzo[a,h]anthracene
135-48-8, Pentacene 159-66-0, 9,9'-Spirobifluorene
191-07-1, Coronene 192-51-8, Dibenzo[fg,op]naphthacene 196-42-9,
Naphtho[2,1,8-qr]naphthacene 198-55-0D, Perylene, Ph deriv
517-51-1, Rubrene 751-38-2, 1,2,3,4-Tetraphenyl-naphthalene
992-04-1, Hexaphenylbenzene 1499-10-1, 9,10-Diphenylanthracene
1714-23-4 2519-10-0, 1,2,3,4,5-Pentaphenyl-1,3-cyclopentadiene
3073-05-0, p-Quinquephenyl 3586-61-6 5710-05-4
20441-06-9 27798-46-5, Benzo[c]naphtho[2,1-p]chrysene
65181-78-4, N,N'-Diphenyl-N,N'-bis(3-methylphenyl)-1,1'-
biphenyl-4,4'-diamine 76185-65-4 123847-85-8
123847-87-0 134008-76-7 134008-77-8
139255-17-7 195443-35-7 204326-94-3
204326-95-4 204326-96-5 204326-97-6
204326-98-7 204326-99-8 204327-00-4

204327-01-5 204327-02-6 204327-03-7

214341-77-2 214341-78-3 214341-79-4 214341-80-7 214341-81-8

214341-83-0 214341-84-1 214341-85-2 214341-87-4

(electroluminescent device contg. tertiary arom. amines and polycyclic arom. hydrocarbons for pos. hole-implanting and transporting)

L27 ANSWER 20 OF 23 HCA COPYRIGHT 2003 ACS

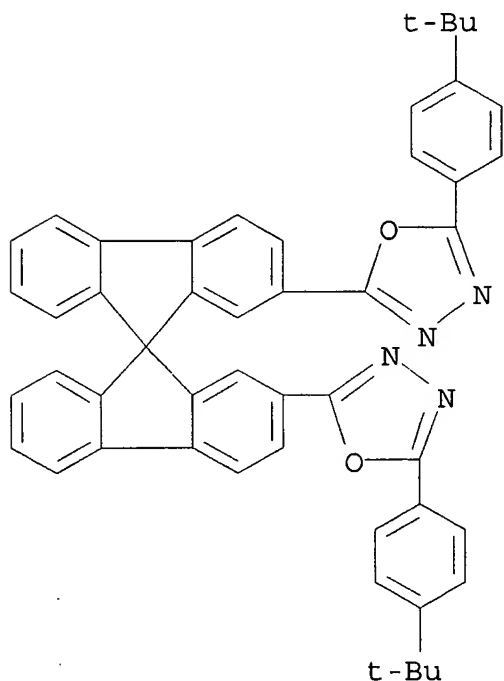
129:21311 **Electroluminescent** device. Spreitzer, Hubert; Lupo, Donald; Schenk, Hermann; Yu, Nu (Hoechst A.-G., Germany). Ger. Offen. DE 19646119 A1 **19980514**, 10 pp. (German). CODEN: GWXXBX. APPLICATION: DE 1996-19646119 19961108.

AB An electroluminescent device whose electroluminescence spectrum does not overlap with the absorption spectrum, contg. ≥ 2 org. layers between 2 electrodes, is characterized by: (a) 2 adjacent org. layers, each having an optical band gap of ≥ 2.5 eV; and (b) the wavelength (λ_{max} , corresponding to an energy E_{max}) at which the electroluminescence has a max. is in a region corresponding to the energy difference ΔE (ionization potential of the 1st org. layer minus electron affinity of the 2nd org. layer), and $E_{max} \leq 2.5$ eV.

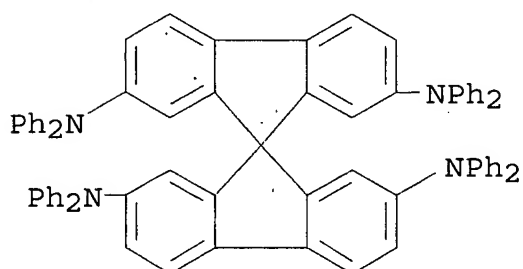
IT 171408-95-0 189363-47-1
(electroluminescent devices contg.)

RN 171408-95-0 HCA

CN 1,3,4-Oxadiazole, 2,2'-(9,9'-spirobi[9H-fluorene]-2,2'-diyl)bis[5-[4-(1,1-dimethylethyl)phenyl]]-(9CI) (CA INDEX NAME)



RN 189363-47-1 HCA
 CN 9,9'-Spirobi[9H-fluorene]-2,2',7,7'-tetramine,
 N,N,N',N',N'',N'',N''',N''''-octaphenyl- (9CI) (CA INDEX NAME)



IC ICM H01L051-20
 ICS H01L051-30; H01L051-40; H05B033-14; C09K011-06
 CC 73-11 (Optical, Electron, and Mass Spectroscopy and Other Related Properties)
 Section cross-reference(s): 76
 ST **electroluminescent** device
 IT **Electroluminescent** devices
 (having org. layers)
 IT 37254-75-4, Aluminum 97, magnesium 3 50926-11-9, Indium tin oxide
 164363-38-6 171408-95-0 189363-47-1
 (**electroluminescent** devices contg.)

L27 ANSWER 21 OF 23 HCA COPYRIGHT 2003 ACS

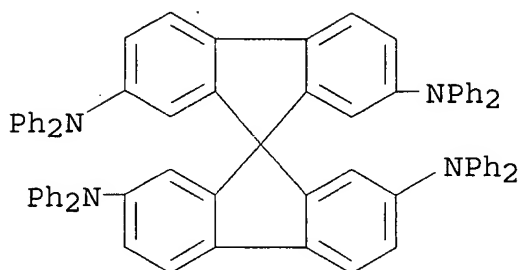
128:210265 Low molecular organic glasses for blue **electroluminescence**. Salbeck, J.; Yu, N.; Bauer, J.; Weissortel, F.; Bestgen, H. (Ackermannweg 10, Max-Planck-Institute for Polymer Research, D-55128, Mainz, Germany). Synthetic Metals, 91(1-3), 209-215 (English) 1997. CODEN: SYMEDZ. ISSN: 0379-6779. Publisher: Elsevier Science S.A..

AB Spiro-linkage is used to modify the steric demand of low mol. org. compds. to improve their processability and morphol. stability, while their electronic properties are retained. These spiro-linked compds. form stable nonpolymeric org. glasses with high glass transition temps., usually assocd. with amorphous polymers. High quality amorphous films with high morphol. stability can be prepd. with these spiro-linked luminescent or charge transport materials by conventional spin-coating techniques as well as by vapor deposition. Based on these spiro-compds., blue **electroluminescence** devices with high color purity, high brightness and low turn-on voltage are presented. A blue **light-emitting** two-layer device, fabricated by combining a hole transporting spiro-TAD with an electron transporting spiro-PBD, shows a turn-on voltage at 2.7 V and a luminance of 500 cd/m² at 5 V.

IT 189363-47-1
 (low mol. org. glasses for blue **electroluminescence**)

RN 189363-47-1 HCA
 CN 9,9'-Spirobi[9H-fluorene]-2,2',7,7'-tetramine,

N,N,N',N',N'',N'',N''',N''''-octaphenyl- (9CI) (CA INDEX NAME)

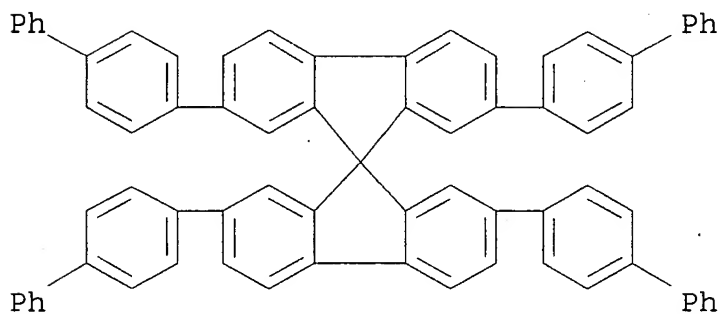


- CC 73-5 (Optical, Electron, and Mass Spectroscopy and Other Related Properties)
- ST spiro compd glass blue **electroluminescence**
- IT Luminescence, **electroluminescence**
(blue; low mol. org. glasses for blue **electroluminescence**)
- IT Organic glasses
Spiro compounds
(low mol. org. glasses for blue **electroluminescence**)
- IT **189363-47-1**
(low mol. org. glasses for blue **electroluminescence**)
- L27 ANSWER 22 OF 23 HCA COPYRIGHT 2003 ACS
- 128:41356 Spiro-linked compounds for use as active materials in organic **light emitting** diodes. Salbeck, Josef; Weissoertel, Frank; Bauer, Jacqueline (Max-Planck-Inst. Polymer Research, Mainz, D-55128, Germany). Macromolecular Symposia, 125(Organic Light-Emitting Materials and Devices), 121-132 (English) 1998. CODEN: MSYMEC. ISSN: 1022-1360. Publisher: Huethig & Wepf Verlag.
- AB Spiro-linkage of low-mol.-wt. entities as a new structural concept for the design of new active materials for **electroluminescent** applications is presented. These spiro-linked compds. result in nonpolymeric org. glasses with high thermal stability as can be derived from their high glass transition temps. (Tg), and characterized by DSC. Blue emitters based on spiro-linked oligophenyles are presented. These compds. are sol. in common org. solvents and show high photoluminescence quantum efficiency in the solid state and high morphol. stability with glass transition temps. .ltoreq.250.degree.. Charge transport materials based on spiro-linked versions of 2-(4-biphenyl)-5-(4-tert-butylphenyl)-1,3,4-oxadiazole (PBD) for electron transport, and spiro-linked versions of triphenyldiamine derivs. (TPD) for hole transport show improved morphol. properties with nearly unchanged electronic properties compared to the parent compds. High quality amorphous films can be prepd. with the spiro compds. by vapor deposition as well as by simple spin coating.
- IT **171408-93-8 187040-56-8**
(UV absorption and luminescence spectra of spiro compd. used as

electroluminescent material in org. LEDs)

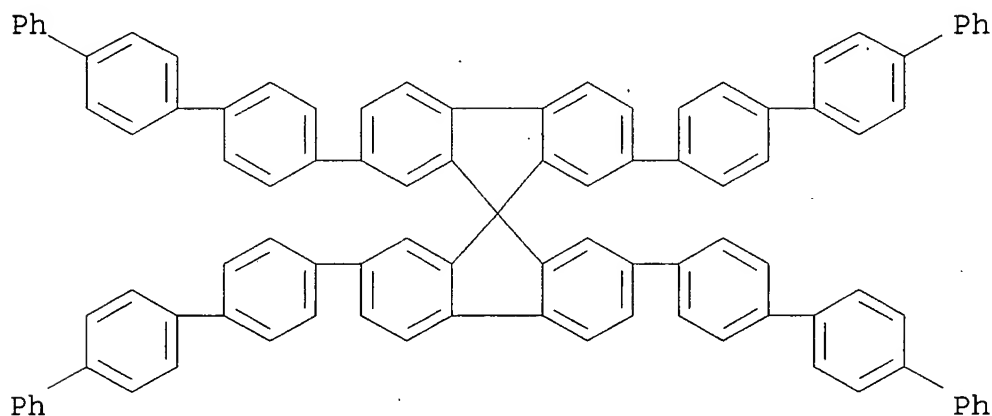
RN 171408-93-8 HCA

CN 9,9'-Spirobi[9H-fluorene], 2,2',7,7'-tetrakis([1,1'-biphenyl]-4-yl)-
(9CI) (CA INDEX NAME)



RN 187040-56-8 HCA

CN 9,9'-Spirobi[9H-fluorene], 2,2',7,7'-tetrakis([1,1':4',1''-
terphenyl]-4-yl)- (9CI) (CA INDEX NAME)

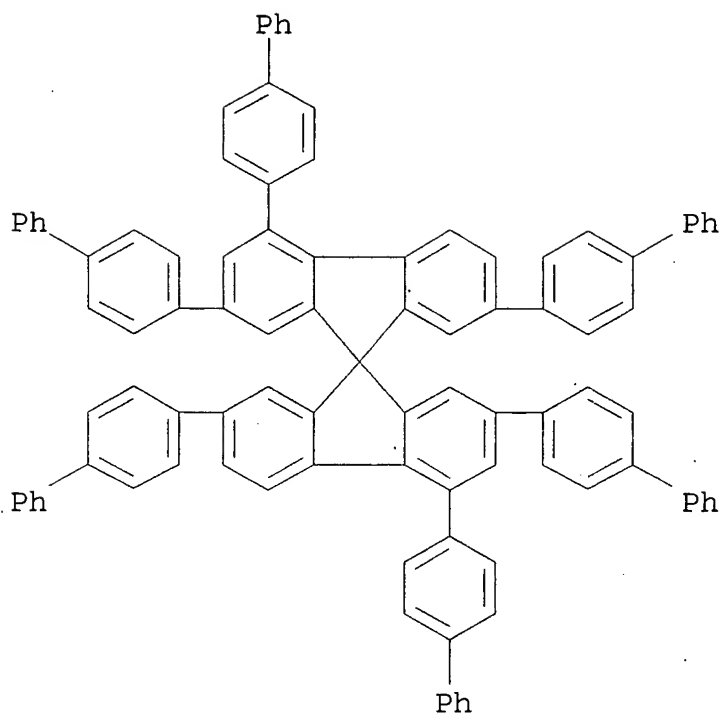


IT 171408-94-9 187040-57-9 187040-58-0
199673-97-7

(UV absorption and luminescence spectra of spiro compd. used as
electroluminescent material in org. LEDs)

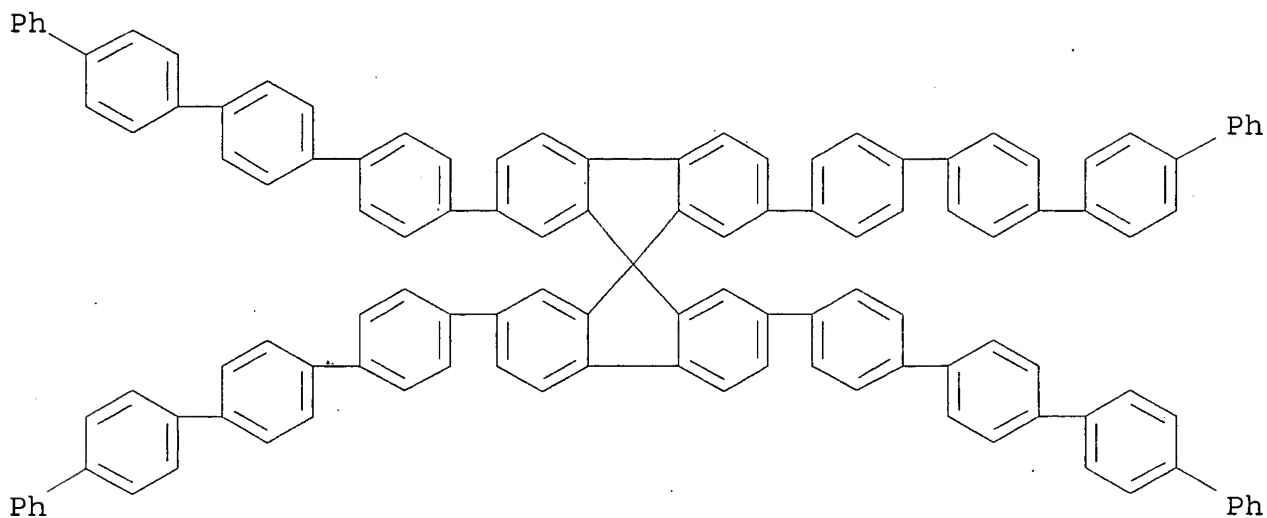
RN 171408-94-9 HCA

CN 9,9'-Spirobi[9H-fluorene], 2,2',4,4',7,7'-hexakis([1,1'-biphenyl]-4-
yl)- (9CI) (CA INDEX NAME)



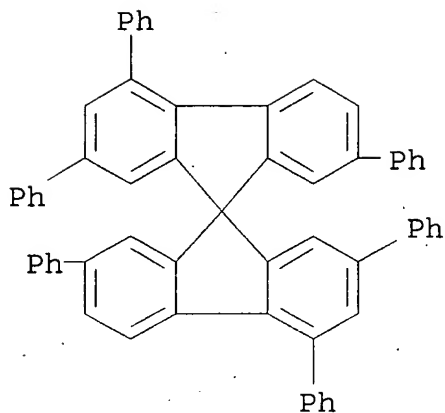
RN 187040-57-9 HCA

CN 9,9'-Spirobi[9H-fluorene], 2,2',7,7'-tetrakis([1,1':4',1'':4''],1'''-quaterphenyl)-4-yl)- (9CI) (CA INDEX NAME)



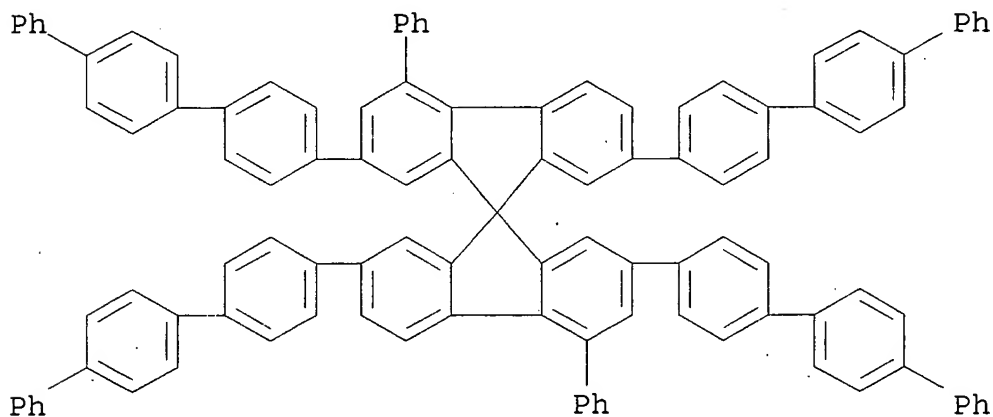
RN 187040-58-0 HCA

CN 9,9'-Spirobi[9H-fluorene], 2,2',4,4',7,7'-hexaphenyl- (9CI) (CA INDEX NAME)



RN 199673-97-7 HCA

CN 9,9'-Spirobi[9H-fluorene], 4,4'-diphenyl-2,2',7,7'-
tetrakis([1,1':4',1''-terphenyl]-4-yl)- (9CI) (CA INDEX NAME)

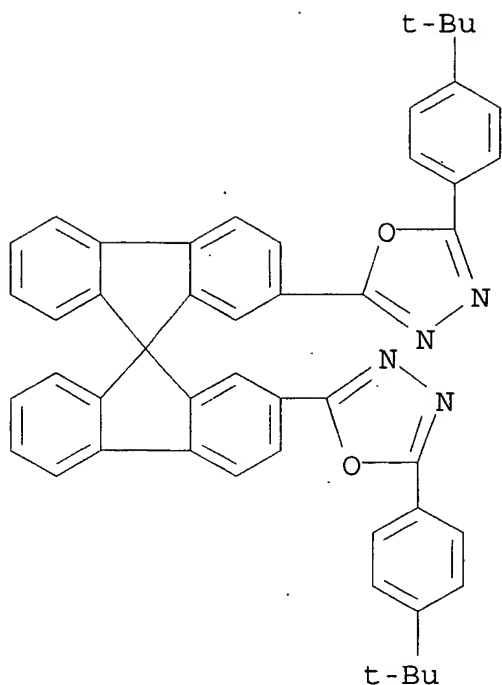


IT 171408-95-0

(UV absorption and luminescence spectra of spiro-linked compds.
used as electron transport material in org. LEDs)

RN 171408-95-0 HCA

CN 1,3,4-Oxadiazole, 2,2'-(9,9'-spirobi[9H-fluorene]-2,2'-diyl)bis[5-[4-(1,1-dimethylethyl)phenyl]- (9CI) (CA INDEX NAME)

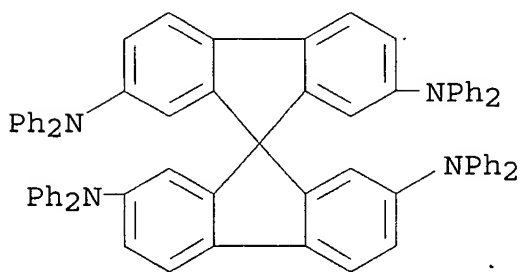


IT 189363-47-1

(UV absorption and luminescence spectra, DSC, and CV of spiro-linked compds. used as electron transport material in org. LEDs)

RN 189363-47-1 HCA

CN 9,9'-Spirobi[9H-fluorene]-2,2',7,7'-tetramine,
N,N,N',N',N'',N'',N''',N''''-octaphenyl- (9CI) (CA INDEX NAME)



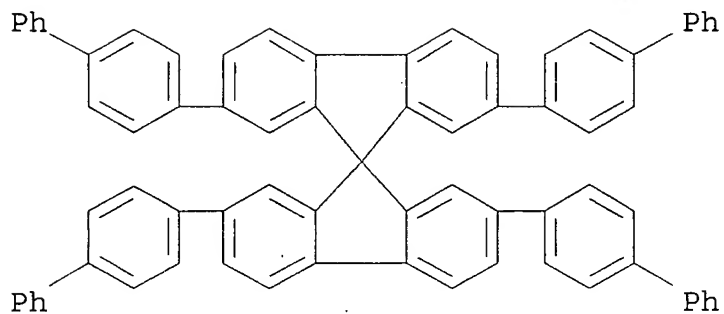
CC 73-12 (Optical, Electron, and Mass Spectroscopy and Other Related Properties)

ST spiro linked compd luminescence org LED;
electron transport spiro compd org LED; glass transition temp spiro compd LED

IT Electroluminescent devices

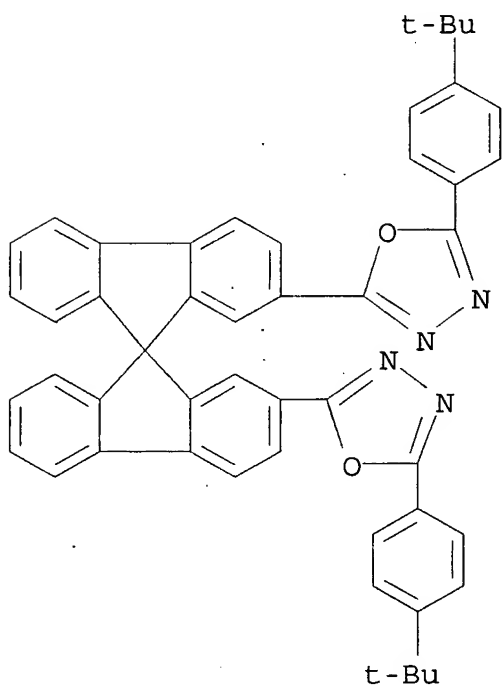
(UV absorption and luminescence spectra, DSC, and CV of spiro-linked compds. used as electroluminescent and

- electron transport material in org. LEDs)
- IT Spiro compounds
(UV absorption and luminescence spectra, DSC, and CV of spiro-linked compds. used as **electroluminescent** and electron transport material in org. LEDs)
- IT Phosphors
(**electroluminescent**; UV absorption and luminescence spectra, DSC, and CV of spiro-linked compds. used as **electroluminescent** and electron transport material in org. LEDs)
- IT Glass transition temperature
Luminescence
UV and visible spectra
(of spiro-linked compds. used as **electroluminescent** and electron transport material in org. LEDs)
- IT 171408-93-8 187040-56-8
(UV absorption and luminescence spectra of spiro compd. used as **electroluminescent** material in org. LEDs)
- IT 171408-94-9 187040-57-9 187040-58-0
199673-97-7
(UV absorption and luminescence spectra of spiro compd. used as **electroluminescent** material in org. LEDs)
- IT 171408-95-0
(UV absorption and luminescence spectra of spiro-linked compds. used as electron transport material in org. LEDs)
- IT 189363-47-1
(UV absorption and luminescence spectra, DSC, and CV of spiro-linked compds. used as electron transport material in org. LEDs)
- L27 ANSWER 23 OF 23 HCA COPYRIGHT 2003 ACS
- 126:322720 Spiro linked compounds as active materials in organic **light emitting** diodes. Salbeck, J.; Bauer, J.; Weissortel, F. (Corp. Res., Hoechst Ag, Mainz, D-55128, Germany). Polymer Preprints (American Chemical Society, Division of Polymer Chemistry), 38(1), 349-350 (English) 1997. CODEN: ACPPAY. ISSN: 0032-3934. Publisher: American Chemical Society, Division of Polymer Chemistry.
- AB Spiro-linked materials were synthesized and investigated. Blue-emitting luminescent materials comprising sym. spiro-linked oligo-phenyls up to the deciphenyls were prepd. Materials with charge transport properties were also prepd. The materials form stable glasses with high glass transition temps. Amorphous films of the materials can be prepd. by both spin-coating and vapor deposition processes, and application to LEDs is indicated.
- IT 171408-93-8 171408-95-0 187040-56-8
187040-57-9 189363-46-0 189363-47-1
(spiro-linked compds. as luminescent and charge-transport materials)
- RN 171408-93-8 HCA
- CN 9,9'-Spirobi[9H-fluorene], 2,2',7,7'-tetrakis([1,1'-biphenyl]-4-yl)-(9CI) (CA INDEX NAME)



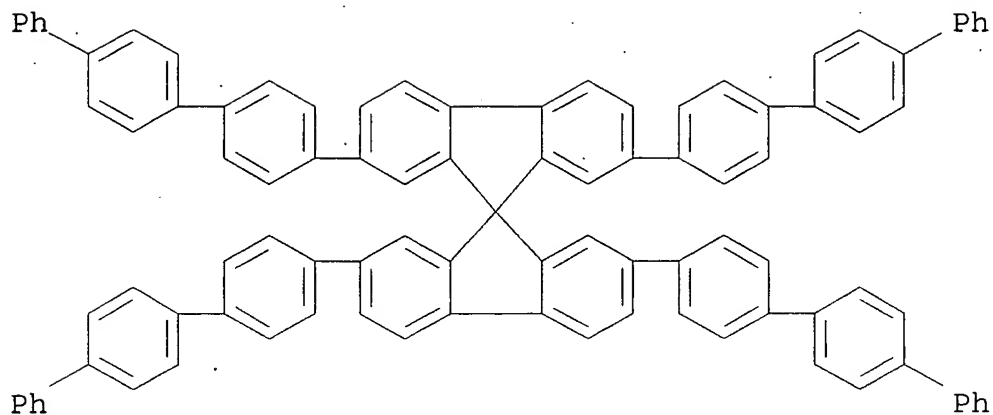
RN 171408-95-0 HCA

CN 1,3,4-Oxadiazole, 2,2'-(9,9'-spirobi[9H-fluorene]-2,2'-diyl)bis[5-[4-(1,1-dimethylethyl)phenyl]- (9CI) (CA INDEX NAME)



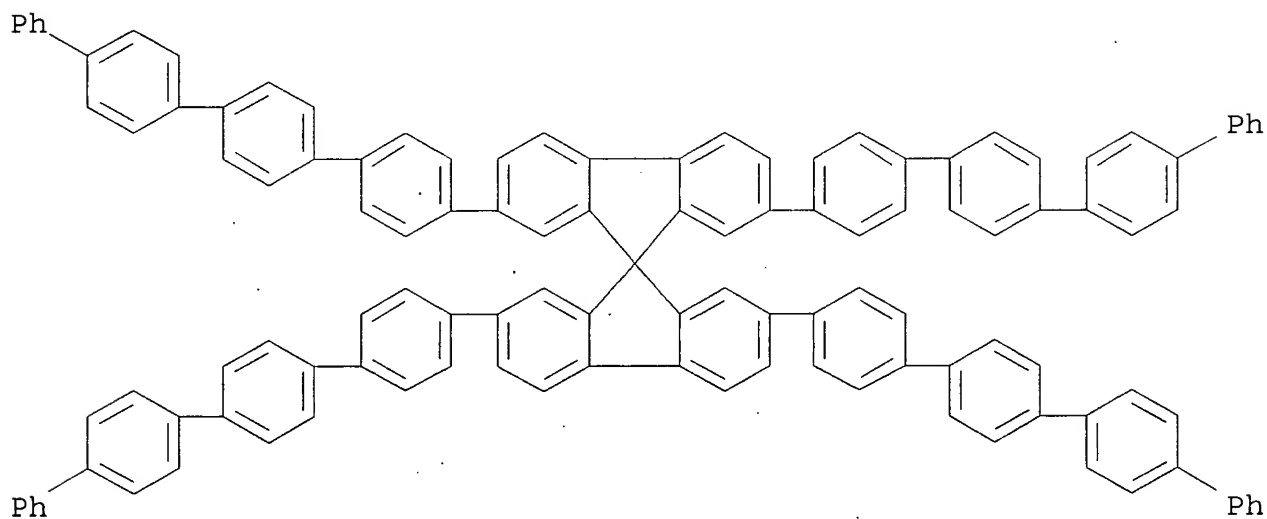
RN 187040-56-8 HCA

CN 9,9'-Spirobi[9H-fluorene], 2,2',7,7'-tetrakis([1,1':4',1''-terphenyl]-4-yl)- (9CI) (CA INDEX NAME)



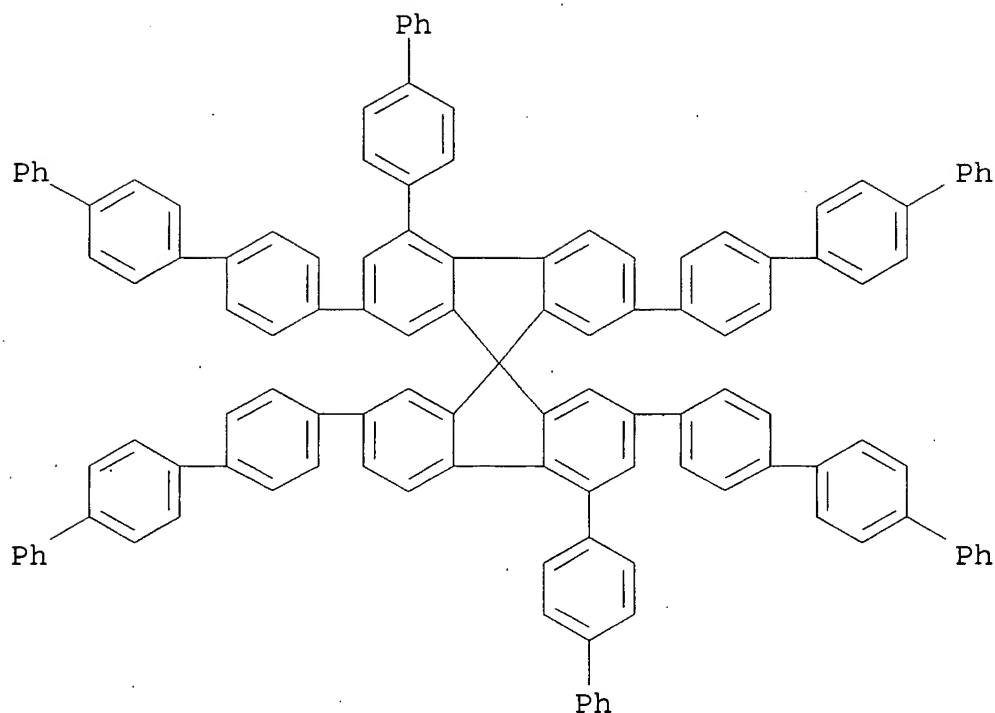
RN 187040-57-9 HCA

CN 9,9'-Spirobi[9H-fluorene], 2,2',7,7'-tetrakis([1,1':4',1'':4'',1'''-quaterphenyl]-4-yl)- (9CI) (CA INDEX NAME)

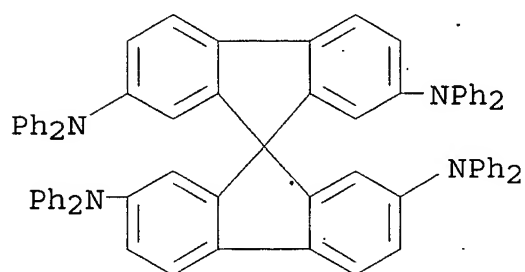


RN 189363-46-0 HCA

CN 9,9'-Spirobi[9H-fluorene], 4,4'-bis([1,1'-biphenyl]-4-yl)-2,2',7,7'-tetrakis([1,1':4',1'':4'',1'''-terphenyl]-4-yl)- (9CI) (CA INDEX NAME)



RN 189363-47-1 HCA
 CN 9,9'-Spirobi[9H-fluorene]-2,2',7,7'-tetramine,
 N,N,N',N',N'',N''',N''',N''''-octaphenyl- (9CI) (CA INDEX NAME)



CC 73-5 (Optical, Electron, and Mass Spectroscopy and Other Related Properties)
 Section cross-reference(s): 25, 28
 IT 171408-93-8 171408-95-0 187040-56-8
 187040-57-9 189363-46-0 189363-47-1
 (spiro-linked compds. as luminescent and charge-transport materials)